SCIENCE

EDITORIAL COMMITTEE: S. NEWCOMB, Mathematics; R. S. WOODWARD, Mechanics; E. C. PICKERING, Astronomy; T. C. MENDENHALL, Physics; R. H. THURSTON, Engineering; IRA REMSEN, Chemistry; JOSEPH LE CONTE, Geology; W. M. DAVIS, Physiography; HENRY F. OSBORN, Paleontology; W. K. BROOKS, C. HART MERRIAM, Zoology; S. H. SCUDDER, Entomology; C. E. BESSEY, N. L. BRITTON, Botany; C. S. MINOT, Embryology, Histology; H. P. BOWDITCH, Physiology; J. S. BILLINGS, Hygiene; WILLIAM H. WELCH, Pathology; J. MCKEEN CATTELL, Psychology; J. W. POWELL, Anthropology.

FRIDAY, AUGUST 17, 1900.

CONTENTS:

Work of the U. S. Geological Survey, 1899–1900: BAILEY WILLIS..... 241

Second Report of the Committee of the German Chemical Society on Atomic Weights: J. L. H.... 246

The Fossil Shells of the Los Angeles Tunnel Clays: ROB'T E. C. STEARNS..... 247

The Royal College of Surgeons..... 250

The Development of Surgery: SIR WILLIAM MACCORMAC..... 254

Chemistry at the New York Meeting of the American Association: PROFESSOR A. A. NOYES..... 263

Anthropology at the New York Meeting of the American Association: DR. FRANK RUSSELL..... 265

Scientific Books:—
Vermorel's Etude sur la grêle: PROFESSOR E. W. HILGARD. *Scudder's Guide to the Commoner Butterflies:* DR. W. J. HOLLAND..... 269

Scientific Journals and Articles..... 270

Discussion and Correspondence:—
International Catalogue of Scientific Literature: DR. RICHARD RATHBUN. *The Buffalo Exposition:* A. L. BENEDICT..... 270

Notes on Inorganic Chemistry: J. L. H..... 272

The International Association of Academies..... 273

Defective Vision of Board School Children..... 274

Protection of Wild Animals in Africa..... 275

Scientific Notes and News..... 276

University and Educational News..... 279

MSS. intended for publication and books, etc., intended for review should be sent to the responsible editor, Professor J. McKeen Cattell, Garrison-on-Hudson, N. Y.

*WORK OF THE U. S. GEOLOGICAL SURVEY, 1899–1900.**

Appropriations.—The appropriations for the U. S. Geological Survey for the fiscal year 1899–1900 amounted initially to the sum of $817,190. During the winter of 1900 additional appropriations were made for special purposes, making the total amount available for the year $889,740.89. For the fiscal year 1900–1901 the appropriations passed by the last Congress amount to $969,690, there having been important increases in response to public demand for work. The Division of Mineral Resources receives an advance of $20,000, raising its appropriation to $50,000; the Division of Hydrography receives $100,000 in lieu of $50,000 last year, and the demand for geologic work is recognized by an increase of that appropriation from $110,000 to $150,000.

Topographic Work.—The federal appropriation for topographic work remained the same as during the past year, namely $240,000, except that there was a considerable increase for the Alaskan surveys, the amount available for geologic and topographic investigations being $60,000. The list of states co-operating was increased by the addition of Ohio, the legislature having provided $25,000 for topographic mapping.

From the appropriation for surveying the forest reserves an allotment of $90,000 was

* Published by permission of the Director.

made by the director for the continuation of topographic mapping within and adjacent to the reserves, including triangulation and spirit leveling and the marking of certain reserve boundaries, and under this allotment operations will be conducted in the following reserves: Bighorn, Black Hills, Lewis and Clarke, Flathead, Uinta, Gila River, Prescott, Sierra, Pine Mountain and Zaca Lake, San Jacinto, San Bernardino, Washington, and Mount Rainier.

The general topographic operations contemplated for the present year include the mapping of about 40,000 square miles. This area is distributed through about eighty-five quadrangles on two scales, and twenty-seven States.

The topographic mapping is progressing steadily if slowly, as is indicated by the fact that for the past five years the percentage of surveyed area has been increased each year approximately one per cent. the total percentage at the end of the fiscal year 1900 being twenty-eight. If this rate is not increased it will require over seventy years to complete the survey of the United States, to say nothing of the colonial acquisitions, but it is hoped that this period may be reduced. That the present rate of appropriation is inadequate is evident from the fact that in making up the plans for the current fiscal year it was necessary to deny applications for work covering about as much territory as that for which surveys were provided. These applications came, not only from the officers of the surveys engaged in geologic, hydrographic, and forestry investigations, but from the business interests of the country generally.

Geologic Work.—During the spring of 1900 the Director has planned, with the approval of the Secretary of the Interior, an important reorganization of the Geologic Branch. In order that the significance of this step should be appreciated in all its bearings, it is desirable briefly to review the history of the administrative and scientific control within the Survey. In the First Annual Report, Mr. King set forth a plan of organization based on grand geographic and geologic provinces. The work being then restricted to the national domain west of the 101st meridian, four divisions were established, that of the Rocky Mountains under Emmons, that of the Colorado under Dutton, that of the Great Basin under Gilbert, and of the Pacific under Hague. Each of these divisions corresponded to a province within which the geological phenomena had a certain unity of history and character, and it was wisely argued that the work in each should be directed by a geologist familiar with the special problems of the area entrusted to him. At the same time, the limited appropriations of the Survey and the adopted policy of surveying the most important mining districts led to a concentration of effort upon Leadville, Eureka, and the Comstock Lode, so that initially comparatively little progress was made in solving the broad geologic problems presented to each division. The principal contributions which the West yielded to the philosophy of the science were made by the surveys through whose consolidation the Geological Survey was created. With the growth of the Survey and the addition to its corps of many of the leading minds in American geology, more numerous geographic divisions were established and their limits became more artificial. Thus in the Sixth Annual Report we find enumerated, in addition to the ones first established, the Division of Glacial Geology (Chamberlin), the Division of Volcanic Geology (Dutton), the Division of the Crystalline Schists of the Appalachian and Lake Superior Regions (Pumpelly and Irving respectively), the Appalachian Region (Gilbert), and the Yellowstone Park (Hague). As divisions

became more numerous and restricted, the administrative machinery became more complex, and the opportunities afforded the geologists in charge to study broad problems became more and more limited. Finally, it was found that the administrative relations were not only difficult but expensive, since they involved the maintenance of independent offices and clerks, and in the interests of economy and efficiency the system of geographic divisions was abolished in 1893. In its place was substituted an organization by parties, of which there were at first twenty and subsequently nearly double that number, each acting independently of the other except in so far as they were all brought into co-operation through the Director and the Assistant in Geology. Broad co-ordination of scientific work was for the time being subordinated to the accumulation of facts, especially in the form of geologic maps, rather than to the consideration of philosophic problems. After six years of this activity in the working out of special problems, the time has come for broader supervision and co-ordination of work, and to this end the following appointments have been made: Geo. F. Becker, Geologist in charge of Physical and Chemical Research; T. C. Chamberlin, Geologist in charge of all Pleistocene Geology; S. F. Emmons, Geologist in charge of Investigation of Metaliferous Ores; C. Willard Hayes, Geologist in charge of Investigation of Non-Metaliferous Economic Deposits; T. W. Stanton, Paleontologist in charge of Paleontology; C. R. Van Hise, Geologist in Charge of Pre-Cambrian and Metamorphic Geology; Bailey Willis (Assistant in Geology to the Director), Geologist in charge of Areal Geology.

The field of supervision of each geologist in charge is coextensive with the work of the Geological Survey and relates to all parties engaged in work connected with his special subject. His assistance in field or office work may appropriately be offered or invited. His opinion is to be considered authoritative in subjects under his supervision, and his approval to any report may be required. This authority, however, is restricted to the scientific aspects of the work. Administrative direction remains as heretofore wholly in the hands of the director, and the work of the survey will proceed after the manner which has been found successful—of authorization of plans of operations after full consideration and conference upon estimates submitted by geologists in charge of parties.

Under the organization now adopted, each geologist is at liberty to make full use of the facts which he observes within his field of operations, the degree of supervision exerted by the geologist in charge of any particular subject to be duly credited in an appropriate manner. For the geologists in charge the plan affords an opportunity to study a special subject in all its aspects throughout the field of operations of the survey, either directly by personal observation or by conference with associates. This opportunity is unequaled in both multiplicity and magnitude of the phenomena presented to each specialist.

In SCIENCE, Volume X., No. 242, August 18, 1899, was given a somewhat detailed account of the geologic work of the survey. The following notes refer to extension of the work there described:

In the Atlantic Coastal Plain work in the Mesozoic and later formations has been carried out in the Cape Cod district (Shaler), and in Maryland and Virginia (W. B. Clark).

The investigations of Bascom, Dale, Emerson, Hobbs, Keith, Kemp, Mathews, Williams, and Wolff in the pre-Cambrian and metamorphic rocks of the Appalachian Range have been continued at various points from New England to Georgia.

In the belt of folded Paleozoic strata of

the Appalachian Valley and Allegheny ranges no field work is now in progress except incidentally to the investigation of the Coal Measures. Folios of the Geologic Atlas, for which the data have been on hand, have recently been advanced to publication. The detailed surveys of the Appalachian coal field (Campbell and David White) have, however, been pushed energetically in West Virginia, Kentucky, and Ohio.

In the Lake Superior region the studies of the iron-bearing ranges begun under Irving are approaching completion. The work on the Vermillion Range, Minnesota (Van Hise and others) is nearly accomplished, and the Mesabi district alone remains to be surveyed. The results of the survey of the Menominee district are published as a folio of the Geologic Atlas.

The long continued investigation of the glaciated region is now bearing fruit in a series of monographs by Mr. Leverett, one of them having been published, another being ready for the printer, and the work on others being planned.

The geology of Indian Territory is being studied in prosecution of surveys having for their initial purpose the determination of the stratigraphy and structure of the coal field. Three folios of the Geological Atlas have been prepared (Taff), and data for others are accumulating.

The Black Hills has long been a center of much geologic interest. Detailed stratigraphic surveys of the Paleozoic and Mesozoic formations around all but the northern portion of the Hills have been very successfully and carefully carried out (Darton), and there has resulted a report to be published in the twenty-first Annual, in which the facts of stratigraphy and structure are set forth with much detail and clearness.

The detailed investigation of the Spearfish and Sturgis quadrangles in the vicinity of Deadwood has resulted in an important contribution to our knowledge of laccolithic intrusions (Jaggar), and the mining districts have been carefully examined (Emmons and Iriving).

The investigating of the Butte, Montana, mining district has been facilitated by the workings opened up during litigation, and advantage has been taken of this fact to study that interesting region exhaustively. A survey was also made of the Elkhorn district (Emmons and Weed). In connection with the examination of the copper deposits in general, those of the Appalachian Range have also been visited.

In the San Juan Mountains of Colorado the work begun several years ago continues with accuracy and energy, and in connection with it special investigations have been made of the Silverton and Rico mining districts (Cross, Spencer, and Ransome). The publication of the Telluride folio marks a departure in the character of the Geologic Atlas, in as much as it contains a detailed record of the geologic facts (Cross, Purington).

In the Great Basin province, southern Nevada was traversed during a prolonged reconnaissance, the purpose of which was to secure data for the geologic map of the United States (Spurr).

Where the Rio Grande traverses the mountain region of Texas it flows through a grand canyon, from which several parties, including those of the Boundary Surveys, turned back after vain efforts to traverse it. In the autumn of the past year this canyon was successfully studied and an important contribution to the geology of western Texas was thus made (Hill).

In Washington the surveys of the Cascade Range were extended by the survey of the Mount Stuart quadrangle and the partial survey of the Snoqualmie quadrangle and the Tacoma folio was completed and published (Willis, Smith, and Mendenhall).

In Oregon work in the Roseburg and

Coos Bay quadrangles having been completed and the reports advanced to publication, surveys were continued in the Port Orford quadrangle, covering the southwestern portion of the Klamath Mountains (Diller).

In the Sierra Nevada and adjacent ranges, a survey was made of the Silver Peak quadrangle, Nevada, and additional work was done on the Yosemite and Mount Lyell quadrangles, California, in preparation for final survey (Turner).

In the vicinity of San Francisco the study of the Coast Ranges was continued, and material prepared for publication as folios (Lawson). A reconnaissance was made of the Santa Lucia Range from Monterey to San Luis Obispo (Willis, Fairbanks).

Alaska.—In the autumn of 1899 all the Alaskan parties returned after having successfully accomplished the tasks laid out for them without serious accident. Messrs. Peters and Brooks had traversed the northern foothills of the St. Elias Range, finding one of the most interesting features of the region to be a recently abandoned broad valley, trending northwest and southeast, across which the present streams now flow. The geology of the region, including formations from the ancient metamorphic schists to Tertiary deposits and associated igneous rocks, was studied along the route of progress, and occurrences of copper on the northern side of the Wrangel Alps were located. North of the Yukon a traverse was carried from Eagle City to the Koyukuk, and the headwaters of that stream, far beyond the Arctic Circle, were explored by Mr. Schrader. The general surface of the Yukon plateau was traced into the summits of high mountain ranges, and the distribution of the various geologic formations along the route made out. The reports of these expeditions are included in the Twenty-first Annual. Late in the autumn both Schrader and Brooks, hearing of the Cape Nome excitement, proceeded to Nome, and there, in spite of the wintry season, gathered data for a report, which was published as a special document during the winter. Plans for Alaskan work during the current fiscal year were matured as early as Congressional action permitted, and at the present time Schrader, Spencer and Gerdine are entering the Copper River region to undertake a detailed topographic and geologic survey of the Chettyna district, while Messrs. Barnard, Peters, Brooks and Mendenhall, with a strong corps of assistants, are *en route* in the Coast Survey steamer *Pathfinder* to Golofnin Bay, to undertake a topographic and geologic survey of the Seward Peninsula, of which Nome is now the center of interest. In the preparation and execution of these plans the Coast and Geodetic Survey and the Geological Survey have cordially co-operated to the great advantage and economy of the work.

Hydrographic Work.—This branch of the Geological Survey is making systematic examination of the water resources of the United States, considering water as a mineral of fundamental economic importance. Not only are the fluctuations of surface streams being investigated, but the occurrence of water underground, especially where reached by deep or artesian wells. During the past year this work has attracted widespread public attention, and the demand for data, both published and in process of completion, has been notable. This has come from all parts of the United States, but especially from the Appalachian region where water powers are being utilized, and from the arid region of the far West, where agricultural development depends upon irrigation. Engineers and investigators appreciate the importance of accurate data concerning the flow of streams and their fluctuations from season to season and from year to year. The recent disaster to the dam at Austin, Texas, which cost, with its acces-

sories, one and one-half millions of dollars, has lent tragic emphasis to this point.

In 1888 the Director of the Geological Survey was authorized by Congress to examine the arid region with reference to reclamation of agricultural lands by irrigation. The initial appropriation of $100,000, which was raised to $250,000 in 1889, was discontinued for several years thereafter; but having been restored in part, it has been from time to time increased, and of the $100,000 appropriated for hydrographic work a large part is expended in ascertaining the service of streams, in surveying reservoir sites, and determining the possibilities and cost of flood water storage in the West.

During the present year a notable increase in hydrographic work is being made in the State of New York in co-operation with the office of the State Engineer and Surveyor. Streams tributary to the Mohawk and upper Hudson are being measured, the data having importance not only in water power development, but also in consideration of the quantity available for the deep waterway across the State. In the Southern Appalachian region the amount of water coming from the area which it is proposed to include within a National Park is being ascertained, this work being in addition to systematic measurement of streams entering the Atlantic Ocean, such for example as the Delaware, Susquehanna, Potomac, James and Savannah. Various important streams are also being measured along the head waters of the Ohio and Mississippi.

Through co-operation of the Hydrographic and Geologic branches, the investigation of artesian water conditions about Black Hills is being continued, and plans are under consideration for similar studies of southern California and of the southern coastal plain of the Atlantic and Gulf States.

Bailey Willis.

SECOND REPORT OF THE COMMITTEE OF THE GERMAN CHEMICAL SOCIETY ON ATOMIC WEIGHTS.

In 1897 a committee was appointed by the German Chemical Society to consider the subject of atomic weights with especial reference to securing uniformity for practical analytical work. As a matter of fact two distinct standards were in use, $H = 1$ and $O = 16$, and as the latest determinations of Morley had reduced the atomic weight of oxygen to 15.87 ($H = 1$) it made a decided difference in the atomic weights of the heavier elements which standard was used. This committee consisted of Landolt, Ostwald and Seubert, and to the surprise of many, their first report in November, 1898, was unanimous in favor of the standard $O = 16$. Up to this time Seubert himself had used and advocated $H = 1$ and the same was true of most German chemists. The two chief arguments for $O = 16$ are: (1) many of the atomic weights are determined with reference to oxygen or readily reduced to oxygen standard with little error, while reduction to hydrogen brings in a new and unnecessary error, and necessitates a recalculation and new table every time the hydrogen-oxygen ratio is corrected, as it has been several times in the past few years; (2) if $O = 16$ is taken, a large number of most frequently used atomic weights approximate very closely to whole numbers, simplifying calculations.

A second point advocated by the committee in the first report was that only so many figures should be given in the atomic weight of an element, as that the last figure should be correct within half a unit. In this report the suggestion was made of the desirability of international agreement, and a little later the society directed its committee to invite the co-operation of the chief scientific bodies of the world who might be specially interested in

chemistry. Favorable responses were made and twenty different committees appointed. There were from America two (American Chemical Society and American Academy of Arts and Sciences); Belgium, two; Germany, five; England, one; Holland, one; Japan, one; Italy, one; Austro-Hungary, four; Russia, one; Sweden, one; Switzerland, one. Denmark, France and Norway alone made no response to the overtures. Altogether there were fifty-six members of the international committee.

On December 15, 1899, a circular was addressed to these members asking for opinions upon three points:

1. Shall O = 16 be adopted as the standard of atomic weights?

2. To how many decimal places shall the atomic weights be given?

3. Is a smaller permanent committee on atomic weights desirable?

Forty-nine replies were received. As regards the standard, forty favored O = 16, seven H = 1, while Cannizzaro desired both, and Fresenius preferring O = 16 would be satisfied with either. It is interesting to note that six of the votes for H = 1 were German, six other Germans voting for O = 16. The only other vote for H = 1 was from Professor Mallet. Of the other Americans Richards, Gibbs, Remsen and Smith, voted for O = 16, while Clarke and Morley made no reply.

On the second point opinions differed so widely, that the committee was constrained to leave the decision to the smaller permanent international committee to be later appointed. Of the Americans, Richards, Gibbs and Remsen favor stating one figure which is uncertain by more than a unit, while Smith and Mallet would give only so many decimals that the last figure should be correct to less than half a unit.

Views were practically unanimous in favor of a small permanent committee and the committee recommended the appointment of a permanent committee of three chemists who have given special attention to the subject of atomic weights.

In conclusion the committee express a desire to receive the opinions of chemists outside of the international committee as to their preferences for the standard. Such replies should be sent before November 15th, to Professor Landolt, Berlin, N. W. Bunsenstrasse, 1.

In this connection it is interesting to note that the work of this committee is the final outcome of an agitation which was begun in this country in 1889 by Dr. F. P. Venable in a paper published in the *Journal of Analytical Chemistry* (3: 48), and which was taken up the following year by Dr. Brauner, of Prague, and very warmly discussed before the German Chemical Society by Ostwald, V. Meyer, Seubert and Brauner. At that time Meyer and Seubert advocated H = 1 for the standard and this view has had many supporters in Germany but few elsewhere. The argument in its favor seems to be the impossibility from a didactic standpoint of taking *sixteen* as a *unit*. In his first paper Venable pointed out clearly the distinction between the idea of *standard* and *unit*, showing that a standard need not be a unit, and this view has been generally adopted by most chemists outside of Germany.

J. L. H.

THE FOSSIL SHELLS OF THE LOS ANGELES TUNNEL CLAYS.

THE detection of a species of *Radiolites*, by Mr. Homer Hamlin, in the clays perforated in the course of drifting the Third Street tunnel in the city of Los Angeles is a discovery of noteworthy importance by reason of its bearing upon the question of the geologic age of the region hereabout. These clays, which will be more fully described by Mr. Hamlin or myself when the tunnel excavation is completed, have

yielded other interesting forms—many examples of a new species of *Lima* (*L. Hamlini* Dall) of unusual size and of quite distinct characteristics, as well as two of the three species of '*Plagiostoma*,' described and figured by the late Dr. John B. Trask in the Proc. California Acad. Sciences in 1856. They were assigned by him to 'the Cretaceous rocks of Los Angeles' County. These are listed (? as one and the same species) under the head of 'Tertiary and Quaternary Mollusca,' in Dr. J. G. Cooper's 'Catalogue of Californian Fossils,'* as *Pecten Pedroanus* Trask, Mioc.—'San Pedro,' with the remark, 'may be an *Aucella* and Cretaceous.'

Dall† refers to Trask's species '*P. Pedroanus* + *P. annulatus*' and '*P. truncata*' in his comments on the Pectens of the West Coast in the 'Tertiary Fauna of Florida,' qualifiedly referring them to the Miocene. Dr. Cooper in his prefatory remarks to the Catalogue above quoted, says, "It must be remarked that the exact geological position of many fossils in the Tertiary and Cretaceous strata is still unsettled, there not being such distinct divisions between them in California as in some other countries."

The Hippuritidæ which Woodward placed in his Section B, Family VIII. of the Conchifera, includes the genera, *Hippurites* and *Radiolites* of Lamarck as well as other more or less closely related groups, in the Order *Rudistes* of Lamarck. As these forms are but little known, it may be well to quote Woodward's description of *Radiolites*, which is based on examples from the chalk beds of Europe, of which he has given figures in his Manual:‡ "Shell inversely conical, biconic, or cylindrical; valves dissimilar in structure; internal margins smooth or finely striated, simple, continuous; ligamental inflection very narrow, dividing the deep and rugose cartilage pits; *lower valve* with a thick outer layer often foliaceous; its cavity deep and straight, with two dental sockets and lateral muscular impressions; *upper valve*, flat or conical with a central umbo; outer layer thin radiated; umbonal cavity inclined towards the ligament; teeth angular, striated, supporting curved and subequal muscular processes."

The examples from the tunnel clays consist of the remains of four individuals, being portions of the lower valves of two, and the nearly perfect upper valve of a third. The fourth, also an upper valve, is in still better condition; all are bedded in the clay, but are too fragile to admit of separation from the matrix. The upper valve is discoidal in shape and moderately convex, the umbo central; the surface in the third example somewhat rugose, and exhibiting concentric growth-ridges and radiating sculpture; its diameter is about 47 mm., or an inch and three quarters. In the fourth (upper valve) the concentric sculpture is absent and the radiating feature more conspicuous; this consists of closely set thread-like ridges, which extend from the umbo to the extreme periphery of the valve, projecting somewhat beyond, forming a pectinated edge or margin, as seen in certain finely sculptured Limpets and Siphonarias. The diameter of this last is slightly in excess of the other, being 49 mm. These upper valves were found at points so distant from the lower valves, as to warrant the conclusion that they were never connected, but are parts of separate individuals.

But little is left of the lower valves; their concavity is shown by the casts in the clay. Portions of the curious foliaceous lamellæ remain intact, so that their character and relation to the outer surface of said valve is indicated.

The umbos are central or nearly so, in

* Seventh Ann. Rep. State Mineralogist of Cal., 1887–88, pp. 221–308.

† Trans. Wagner Free Inst. Part IV., Vol. III., p. 705, April, 1898.

‡ Recent and Fossil Shells. Ed., 1880, pp. 446–7.

both upper and under valves, and the concavity of the latter is about twice as great as the convexity of the upper valve.

Perhaps a better idea of the form and other features of the lower valve may be understood by the following: Take an elevated limpet-shell that is circular, or nearly so in marginal outline with an apex that is central. Cover the outside with closely-set radiating lamellæ much elevated or produced, standing up at a right angle from the surface of the shell; the lamellæ as thin as writing paper and projecting beyond the extreme margin or periphery. Now reverse this limpet-shell so that the concavity will be uppermost, and press it firmly into a rather compact clayey sea-bed and the general aspect of the lower valve of the *Radiolite* we are considering, when *in situ* will be seen, and the function of these external lamellæ suggested. Whether the lamellæ, which are so closely set that the interspaces are about as narrow as the lamellæ are thin, are of calcareous or chitinous matter is a point for discussion. The texture of their surfaces, character of fracture, slight prismatic reflections and the fact that they are apparently less perishable than the other portions, favor the latter or chitinous character.

There are no indications tending to show that the lamellæ were inclosed by an exterior wall, which would make them septæ or partitions, and the inter-spaces cells. The lamellar as well as the other exposed parts are much discolored by ferro-oxide making it difficult to determine, so far as color is involved, whether the lamellæ are of a calcareous or ligamentary substance, though the latter is suggested.

"The foliations of the lower valve," of *R. fleuriausus*, according to Woodward, "are sometimes as thin as paper and several inches wide."

In the remains from the tunnel these are about five-eighths of an inch in width.

In the related *Chamadæ* we find the various species fix their shells (lower valves), by means of a limey deposit, the same as the substance of their shells, to *hard* surfaces, cobble-stones, boulders, fixed rock, coral-fronds and to the surfaces of other shells. The grain, texture and lack of density in the ordinary clays are not favorable to attachment by a *flat* or horizontal calcareous deposit. The remarkable lamellar development in the *Radiolites* whether epidermidal or calcareous, meets this character of sea-bed, by the projection of the lamellæ into the clay, and furnishes an interesting illustration of special adaptation to peculiarities of habitat or station, for by these lamellæ which cover the entire surface (presumably) of the under valve, fixity is obtained in an effective manner.

These forms probably lived where patches of the sea-bed of a clayey character prevailed, at a depth below the agitation of the water during storms.

For a more thorough determination of the characters of this *Radiolite*, which for convenience may be called *R. Hamlini*, further material is awaited. While the conditions of the specimens thus far obtained does not admit of a complete diagnosis, they are nevertheless sufficient to indicate the generic relations. These tunnel fossils point to relationship between the clays in which they occur, and the Walalla,* Mendocino county beds visited by Dr. G. F. Becker. The Walalla beds were found to contain fragments of the rare *Coralliochama Orcutti* White, previously discovered by Mr. C. R. Orcutt at Todos Santos Bay, Lower California. *C. Orcutti* occurs at La Jolla, San Diego county, where specimens were collected some years ago by Mr. Hamlin.

Dr. Becker's Walalla collection included other species as well as *Coralliochama*, and

* Walalla is the Indian name: Gualalla, the U. S. Postoffice title.

these, in connection with the Orcutt and La Jolla localities, to quote the comments of Dr. White,* 'seem to represent the fauna of a cretaceous formation, which has not heretofore been recognized,' though Dr. Trask's assignment of his species of '*Plagiostoma*' to the Cretaceous should be borne in mind.

Examples of *Radiolites Hamlini* have also been met with in the Broadway tunnel excavation. These tunnels which are several blocks apart, run in different directions; that on the line of Third street being an east-and-west tunnel, while the Broadway, follows a northerly and southerly course; both penetrate the high ridge overlooking the city, known as Fort Hill, the site of the earthworks thrown up by Fremont at the time of the 'conquest' of Southern California.

The clays excavated on Shatto Heights in the preparation of a site for the Shatto mansion on Orange street are perhaps of a later age than those of the tunnels. The Shatto clays contained shells and sharks' teeth; the former were not saved by Mr. Shatto, and were covered up by the graders just before my visit in 1887.

Rob't E. C. Stearns.

Los Angeles, June 12, 1900.

THE ROYAL COLLEGE OF SURGEONS.†

This year marks the completion of a century since the Royal College of Surgeons received its Royal charter of incorporation from George III.; and the centenary of that event, which, to be precise, happened March 22, 1800, has just been celebrated. But, though the present corporation can only claim a lifetime of 100 years, it can count its descent in a direct line back to a much more remote antiquity, for a Guild of Surgeons, whether technically incorporated or not, seems to have been in existence in London more than six centuries ago, and to have existed ever since in one form or another. In 1368 mention occurs of the surgeons as a distinct body; and the license without which they could not, apparently, practice in the City of London enjoins upon them, among other things, that they serve the people well and truly in their cures and only charge reasonable fees. The association of barbers and surgeons also dates from the same early times, and seems to have been a result of ecclesiastical influence. It would naturally be supposed that the Church would be the repository of the surgical knowledge of the day, just as it was of other science and art, and such indeed appears to have been the case until Innocent III. forbade priests to perform surgical operations, on the ground that the Church 'abhoret a sanguine.' But the prohibition was not sufficient to make them give up all attempts to control surgical practice, and when they were shut off from employing direct methods they had recourse to indirect ones. They began to 'push' the barbers—a class of men of whose services they had, of course, constant need, and who were in the habit of performing minor surgical operations—and gradually erected them into a fellowship of barber-surgeons, a Barbers' Guild being referred to as early as 1308 in the records of the City of London. As may easily be imagined, the cry of unqualified practitioners soon made itself heard, and various regulations were asked for to prevent unskilful persons from practicing the art both by the surgeons and by the better sort of barber-surgeons, who evidently became differentiated from the others who were barbers pure and simple.

Among the most important events in the history of this Guild of Surgeons were its combination with the physicians and the incorporation, about 1423, of the two into one distinct body to control all persons en-

* Vide Bulletins 15 and 18, U. S. Geological Survey.

† From the London *Times*.

gaged in the practice of medicine and surgery. This commonalty of physicians and surgeons drew up elaborate regulations for the guidance of its members in the exercise of their profession, and sought to improve the standard of their knowledge by requiring them to pass examinations before they could be admitted to practice; but it cannot have been a great success, for in a few years all traces of it disappear, and the previous chaotic state of affairs is re-established. About 1423 the Guild of Surgeons is heard of as a separate body making stringent professional regulations for its members, while in 1461 the Barbers' Company obtained a Royal Charter, in which various rights and privileges concerning the mystery or craft of surgery were confirmed to it, without any mention of the Guild of Surgeons. But the latter was far from extinct. In 1492 it obtained a grant of arms, the original of which is still in the Barbers-hall, and in 1511 it was concerned in getting an Act passed which restricted any one from practicing in the City of London or within seven miles of it unless examined and approved by the Bishop of London, or the Dean of St. Paul's assisted by professional assessors. But the surgeons got little thanks for their pains; they were accused of 'minding only their own lucres' and vexing 'divers honest persons, as well men as women, whom God hath endued with that knowledge of the nature, kind and operation of certain herbs, roots and waters,' and in the end the statute was so modified as to be practically, abrogated. In 1540 the surgeons and the barbers were united into one company, both, as the Act says, exercising surgery, but the latter incorporated, the former not. The privileges granted to the barbers by their charter were confirmed and others were added—*e. g.*, they were allowed to take the 'Bodyes of ffoure condemned persons yerely for Anatomies,' while it was also enacted that "no manner of person within the City of London, suburbs and one mile therefrom using any barbery shall occupy any surgery, letting of blood, or any other thing belonging to surgery except drawing of teeth, nor any practising of surgery shall use any shaving." This shows clearly that, though the company was a union of the two bodies, the two professions were not merged together. At the same time constant efforts were evidently needed to keep them distinct, and the surgeon part of the company was often troubled by attempts on the part of the barbers to usurp its functions. But the arrangement subsisted for over 200 years, in spite of monetary embarrassments, difficulties in coping with quackery, and disputes with the physicians, who objected to the surgeons giving internal medicines and declined to consult with them. In time, however, it began to be felt that the 'union of the surgeons with the persons altogether ignorant of the science or faculty of surgery (as the Barbers are)' was not an advantage, and in 1684 a petition was presented for the dissolution of the company. This was unsuccessful, and it was not till 1745 that a Bill to make the barbers of London and the surgeons of London separate and distinct corporations was agreed to by Parliament and received the Royal assent.

The proper style of the new corporation was the 'Masters, Governors, and Commonality of the Art and Science of Surgery.' It consisted of 21 assistants, of whom one was master, two were wardens, and ten were examiners. The master and wardens were elected annually; but the assistants were appointed for life from the freemen. One of the first acts of the company, which was not able to take anything from the Barber-surgeons in the way of hall, books, or plate, was to lease a piece of ground in the Old Bailey—conveniently contiguous to Newgate—and erect a lecture

theater thereon. This was first used in 1751, the meetings of the court of assistants being meanwhile held in the hall of the Stationers' Company. The company started in favorable circumstances; its fees were lower than was possible in the old company, and its members were relieved from the onerous and expensive civic offices which formerly they were liable to serve. But for all that it did not prosper very greatly the cause being to a large extent mismanagement. At first its available funds were scanty, and in 1780 it was nearly insolvent. A new clerk, who was engaged at this time, affected a great change in this respect; but as the finances improved new methods of spending money were discovered—*e. g.*, assistants attending punctually at the meetings of the court were rewarded with half-a-crown, later with half-a-guinea, while meetings of the courts, in some years held almost once a fortnight, were supplemented with expensive dinners at the sole cost of the company. Yet while this sort of thing was going on the lecture theater was without lectures, and the library without books. In 1796 the buildings were found to be very much out of repair, and it was suggested that rather than spend money on them it would be better to sell the lease of the land on which they stood and purchase freehold ground elsewhere on which to erect new premises. Accordingly bids were invited, but at the very meeting at which it was announced that no one of them reached the amount fixed on, the company, by a final act of mismanagement, succeeded in destroying itself. On July 7, 1896, a court, not constituted according to the Act, assembled and transacted business, the result being to determine the corporation's legal existence. Attempts were made to legalize the irregularity by a new Act which also conferred new powers, but they were defeated by the opposition of persons who were in practice without holding the diploma of the company. In the meantime the property in the Old Bailey was sold and a freehold house in Lincoln's-inn-fields—on the site of which stands part of the present Royal College—was purchased. But, as the result of the rejection of its Bill, the company found itself very awkwardly situated, for its business was at a standstill, it could hold no examinations, and many of its members declined to pay their dues. Ultimately a compromise was affected between the court of assistants and the opponents of the Bill, and it was agreed that a new Act should be sought converting the old company into a college. All practitioners in England and Wales were to be subject to its examinations, lectures on anatomy were to be given on a more extended scale, and a library and museum were to be formed. After these terms had been arranged it occurred to some one that a Royal charter was preferable to an Act of Parliament. Accordingly a charter was sought and granted, March 22, 1800.

In this way was constituted the 'Royal College of Surgeons in London,' for the promotion of the study and practice of the art and science of surgery. The number of members in 1800 was about 230, all those who belonged to the old company having the right to become members, though subsequent candidates for membership had to pass a prescribed examination. The court of examiners, whose members held office for life, had also to examine all Army and Navy surgeons, their assistants and mates, and also to inspect their instruments. This constitution remained practically unaltered until 1843, the changes introduced by the supplementary charter of 1822 being merely the substitution of the titles of president and vice-presidents for the old ones of master and governors, and the permission to the college to hold

land and rents in mortmain to the annual value of £2000 instead of £1000. It was not, however, completely satisfactory to the general body of members, and it was felt to be somewhat too narrow and oligarchical in character. The governing body, though it had very great authority in the affairs of the college, was small and self-elected, and its members held their position for life; it was composed of surgeons connected with the metropolitan hospitals, and teachers in private and provincial schools did not think they enjoyed all the privileges to which they were fairly entitled. But, though a Parliamentary committee investigated the matter in 1834, nothing was done until 1843, when a new charter established a more democratic form of government. The title was altered to the Royal College of Surgeons of England, and a new class of 'Fellows' was created. The council, which was to be selected from among these, was increased to 24, and the three senior members were to retire every year, though they were eligible for re-election. No Fellow practicing pharmacy or midwifery could be on the council. The constitution of the court of examiners also was altered; its members were to be selected from the general body of Fellows and not exclusively, as formerly, from the council, while the office was to be held not for life but at the pleasure of the council. The charter ordained that between 250 and 300 members should be selected to be Fellows within three months, and it gave the council further powers to appoint a number of other members to be Fellows within the succeeding nine months. The first Fellows, of whom three still survive, were appointed on December 11, 1843, mainly from the surgeons and lecturers at metropolitan and provincial hospitals, while in August, 1844, a further batch of 242 were selected, including a number of representatives of the naval, military and Indian forces. Of these also three survive. All subsequent Fellows were admitted only after examination. Some slight modification of these arrangements was brought about by the charter of 1852, which gave the council power to elect members of 15 years' standing to the Fellowship without examination, provided they had obtained their diplomas of membership before 1843; also to elect two Fellows annually who were members of over 20 years' standing without restriction as to the date of their diplomas. A supplementary charter in 1859 regulated the appointment of examiners in dental surgery, and a fresh one in 1888 increased the annual value of the land that might be held by the college to £20,000. The final modification in the constitution took place this year, when the council was empowered to elect honorary Fellows to a number not exceeding 50. The first of these is the Prince of Wales.

Since 1800 there have been 61 masters or presidents of the college, who have included the most distinguished surgeons of the time. The great majority only held office for a year, but in six cases the term was three years and in one four; Sir William MacCormac, therefore, who is now the president, has exceeded all his predecessors in length of service, for the present centenary year marks his fifth year of office. John Hunter, perhaps the greatest surgeon that has ever lived, was never a member of the college, because he died before its incorporation; yet he may be accounted its greatest ornament. His famous anatomical collections, greatly enlarged, but still arranged on the simple plan he devised, are housed within its walls. At his death Parliament, tardily enough, voted £15,000 for their purchase and entrusted them to the keeping of the old Corporation of Surgeons. When this was dissolved they were handed over to the custody of the present college, which has proved itself worthy of the trust. The

museum as Hunter left it contained 13,682 preparations arranged in two divisions—normal structures and abnormal structures; now the number of preparations has been doubled, though the museum is still only an expansion of Hunter's. Over and over again—notably in 1835, 1847, and 1888—the college has added new buildings to accommodate the ever-increasing collections, and in the successive conservators it has appointed—W. Clift, Richard Owen, J. T. Quekett, William Flower and Charles Stewart—it has had the good fortune to find men of the highest scientific attainments who have watched over them with unceasing care. To the first of these, admirers of Hunter are specially indebted, for he was the means of preserving a great part of Hunter's anatomical writings. Originally included with the collections, they were borrowed by Sir E. Home, Hunter's executor, who used them for the manufacture of papers and lectures, to which he attached his own name, and then burnt them so as to remove the evidence of his dishonorable conduct. Clift, however, had made copious extracts from the MSS., and in this way an authentic record of about half their substance has been preserved. The college possesses many memorials of Hunter, including a very fine portrait of him by Sir Joshua Reynolds, his consulting chair, clock, pocket-scales, lancet-case, etc. His 'name and fame' are celebrated by a biennial 'Hunterian Oration,' while numerous Hunterian lectures are delivered in accordance with the conditions on which the collections were entrusted to the college. Another service rendered to the cause of surgical knowledge by the college is to be found in the splendid library it has formed and maintains. This originated in a small grant of £50 made at the very beginning of this century; it now contains 50,000 volumes, including journals and transactions of scientific societies. Finally, reference must be made to the college's important share in examining and licensing physicians and surgeons to practice. This portion of its functions is carried on jointly with the Royal College of Physicians—a return to an arrangement 400 years old—the examinations being mostly held in the examination hall built on the Thames Embankment in 1886, at the joint expense of the two bodies. Here not only is medical knowledge tested but its sum increased, for the hall includes extensive laboratories for original research, where materials are supplied at the expense of the colleges to any of their Fellows or members who obtain permission to work in them. In addition anti-toxic serum is prepared for the hospitals of the Metropolitan Asylums Board and for various general and children's hospitals, the cost of the latter supply being defrayed by a grant from the Goldsmiths' Company.

---

*THE DEVELOPMENT OF SURGERY.**

One hundred years have passed since the charter granted by King George III. incorporated the surgeons of England into a Royal College, whereby the art and science of surgery might be the better cultivated and the commonweal of the people of this kingdom benefited.

We meet to-day in order to celebrate the centenary of our incorporation, and the occasion compels us to reflect how far the College has fulfilled its high mission and merited the public consideration and confidence it enjoys, and, as we believe, deserves to enjoy, through unselfish service to the State.

My first and most pleasant duty is to welcome our illustrious guests who have come from many and distant countries to do honor to our College. Amongst them

* Address of welcome on the occasion of the centenary festival of the Royal College of Surgeons of England, delivered by the president, Sir Willlam MacCormac and published in the *British Medical Journal*.

are great surgeons from almost all nations, men who not only hold the highest professional position in their respective countries, but whose public record has made their name familiar to us all, while many of them are dear personal friends.

We have guests, too, our own countrymen, whom we delight to honor, dignitaries of the Church and of the Law, and heads of our ancient seats of learning. Although I cannot enumerate all, I can and do extend to each and every one the most cordial welcome, and would wish to express our grateful appreciation of their presence amongst us.

An occasion like this possesses historic interest. We contrast our present position with that of our predecessors, and rightly congratulate ourselves on our greater knowledge and opportunities, on the facilities we enjoy for investigating the mystery of disease, and for its more effective treatment.

The comparison enables us to realize, as only such a comparison can, the extent of our gains and our increased opportunities for doing good. It leads us at the same time to recognize, as we ought, how large a debt we owe to the workers who have preceded us for so many of those happy results which are now matters of daily accomplishment.

The progress of surgery has been greater during the present century, more especially in the latter portion of it, than in all the preceding centuries combined, and it is of especial interest to us to note that this period of rapid advancement exactly corresponds with the life-history of our College, whose Centenary we are assembled to commemorate.

If we look back—and it is well to look back sometimes—we find in the labors of the old masters of surgery much to enlighten, to widen, and to confirm our views. A knowledge of the history of our art and science tends to make us juster judges both of our own work and that of others.

When we search the history of the development of scientific truth we learn that no new fact or achievement ever stands by itself, no new discovery ever leaps forth in perfect panoply, as Minerva did from the brow of Jove.

Absolute originality does not exist, and a new discovery is largely the product of what has gone before.

> We may be confident that each forward step is not ordered by one individual alone, but is also the outcome in a large measure of the labors of others. The history of scientific effort tells us that the past is not something to look back upon with regret—something lost, never to be recalled—but rather as an abiding influence helping us to accomplish yet greater successes.

Again and again we may read in the words of some half-forgotten worthy the outlines of an idea which has shone forth in later days as an acknowledged truth.

We see numerous instances of this in the history of surgery. Some fellow-worker in years long past has discovered a new fact or indicated the path leading to a fresh truth. It is forgotten, and a century later something nearly the same, or mayhap a little better, is discovered afresh. The psychological moment has arrived, and the discoverer reaps the reward, not only of his own labors, but of those of his predecessors as well.

The countless trials and experiments which ended in the general use of ether and chloroform in surgery, that trebly-blessed discovery of a sure relief from pain, were guided by the experience of previous trials, half successful, half failures.

The patient labor of our distinguished Fellow, Lord Lister, now President of the Royal Society, has been rewarded by a success to which all the world does homage, and which will crown his head with imperishable laurels. Yet none will be readier than Lord Lister to acknowledge how much the antiseptic methods of wound treatment

owe to the researches and discoveries of Pasteur.

If we examine the old books we may find again and again something very near to what is the accepted doctrine of the present time. History, it is said, repeats itself, and so very certainly does surgery. The difficulty of discovering anything new is as great in surgery as in other branches of knowledge. Hippocrates (460 B. C.), the Father of Medicine, classified injuries of the skull in much the same way as that adopted in our modern text-books. He spoke of contusions of the cranium without fracture or depression, of simple fractures, depressed fractures, indented fractures involving the outer table alone, and fractures at a distance from the seat of injury which we now style fractures by *contre-coup*, a classification which leaves but a small margin for improvement.

Many of the surgical instruments found in Pompeii are precisely similar in principle, if not quite equal in workmanship, to those now in use, and Pompeii was destroyed 1800 years ago (A. D. 79).

Heliodorus, who lived at the beginning of the second century A. D., in the time of the Emperor Trajan, was a surgeon of much originality, and appears to have been familiar with some of our modern methods and discoveries. He knew, for instance, of the ligature of arteries, of the radical cure of hernia by extirpation of the sac, and of the excision of a rebellious stricture of the urethra.

Oribasius, who flourished in the middle of the fourth century, A. D., was the friend and physician of the Emperor Julian. He has preserved for us the work of Antyllus, whose treatment of aneurysm by ligature of the vessel above and below the sac, with subsequent incision and evacuation of its contents, has of late years been revived with success, and is still considered by many of our surgeons as the best method of treatment in certain cases. One might cite other examples of old methods consciously or unconsciously revived, but these may perhaps suffice.

The modern specialist finds his prototype in very ancient times, and what we are apt to regard as a recent development is in reality a survival. Herodotus tells us that in Egypt there were as many branches of the profession as there are parts of the human body.

In Europe, until the rise of the Italian Universities, surgery was mainly in the hands of peripatetic charlatans, who cut for stone and operated on hernia. They travelled from town to town, kept their methods secret, and handed them down as family property to their descendants.

The Hippocratic oath restricted the performance of lithotomy to those who had especially devoted their whole energies to the cultivation of this operation, and may partly serve to explain this remarkable survival. Some of these 'cutters' were skilful men, but all were of necessity very ignorant.

A very famous 'cutter,' whose name we do not know, died in Genoa in 1510, and Senerega, the Genoese historian, tells us that his method was to introduce an iron rod along the urethra into the bladder until it touched the stone, which he then extracted through a perineal wound. It has been suggested that this Genoese taught his method to John of Cremona, who is credited with the invention of the grooved staff.

One of the most celebrated 'cutters' was Pierre Franco, who was born in Provence about 1500, A. D. He used a staff and cut on the gripe as well, and employed instruments for the purpose of crushing large stones. He was a man of determination and resource, for he relates a case of a boy in whom having failed to remove a stone by way of the perineum, he successfully performed the suprapubic operation.

The stone was the size of a hen's egg, and the patient subsequently made a good recovery.

Colot was appointed lithotomist to the Hôtel Dieu of Paris in 1556. He had learnt what is known as the 'Marian operation' from an itinerant quack, and he practiced the method with, it is said, much success. The office and the secret descended to his son and to his grandson.

In the great Metropolitan Hospitals—in St. Bartholomew's and St. Thomas's for instance—persons were at one time specially appointed for the purpose of cutting for stone.

John Bamber, who lived during the reigns of William III., Queen Anne, George I. and George II., was the last of the special lithotomists at St. Bartholomew's. He resigned his office in 1730 and his duties were transferred to the surgeons of the hospital, who were specially paid a small stipend each year as lithotomist until 1868. Bamber's portrait by Verelst may be seen at Hatfield House, and Lord Salisbury inherits some portion of his property through an heiress of this line who married a Marquess of Salisbury.

At St. Thomas's Hospital certain of the surgeons were specially appointed to cut for stone, but before the year 1730 there appears to have been a special 'surgeon for the stone,' and the first of these was James Molins, who held a similar office at St. Bartholomew's. There is, indeed, no end to the matters of interest in the history of our art.

The great French surgeon, Guy de Chauliac, who was born about 1300 A. D., studied at the three most famous centers of learning of that time—Bologna for anatomy, Paris for its surgery, and Montpelier for medicine. He travelled much, but finally settled at Avignon, where he became physician in succession to Pope Clement VI., and afterwards to Pope Innocent and Urban. It was in Avignon that he wrote his 'Great Surgery,' and in a special chapter of this work he records opinions which have an application even in the circumstances of our own times. "Formerly," he says, "all medical writers were both physicians and surgeons—that is to say, well educated men; but since then surgery has become a separate branch and fallen into the hands of mechanics."

It is interesting to find from Guy that there were in his day exponents of that modern foolishness called 'Christian Science.' These Guy describes as 'consisting of women and many fools.' They refer the sick of all diseases to the saints, saying:

Le Seigneur me l'a donné ainsi qu'il Lui a plu. Le Seigneur me l'ostera quand il Lui plaira, le nom du Seigneur soit benit. Amen.

As a striking instance of my thesis I may take the great French military surgeon, Ambroise Paré. We know his title to fame in substituting the ligature of arteries for the use of the hot iron in the arrest of hæmorrhage. We know also the story of how he forbade the barbarous practice of pouring boiling oil into gunshot wounds, due to the then prevailing belief that these wounds were poisoned, a belief revived with almost every war, even the latest war in South Africa. Paré had been apprenticed to a provincial barber at the age of 9. Soon afterwards he came to Paris, attended lectures at the Faculty of Medicine, and gained admission to the Hôtel Dieu. He lived there as a dresser for three years, 'seeing and knowing a great variety of diseases constantly being brought there.' He was only 19 when he accompanied the King, François I., into Provence to meet the army of Charles V. He was attached to the Courts of four Kings of France, and, although a Huguenot, was spared at the Massacre of St. Bartholomew by the direct intervention of Charles IX.

It is interesting to learn that Dionis, more than one hundred years after Paré's time,

was urging at the Hôtel Dieu the adoption of arterial ligature in place of the caustic even then in vogue. Dionis too, although he advised the Marian operation for stone, considered that the risks of the suprapubic method had been overestimated, an opinion revived and insisted on by Sir Henry Thompson in our own time.

We all remember J. L. Petit (1674–1750), who invented the tourniquet known by his name in the early part of the last century, and Anel, who tied the branchial artery for traumatic aneurysm at the bend of the elbow, upon which procedure a claim was based for priority over Hunter, though Hunter's operation is wholly distinct in the principle involved.

Towards the end of the eighteenth century Desault, who nearly lost his life in the Revolution, was the leading French surgeon. He was accused of poisoning the wounds of some of his revolutionary patients in the Hôtel Dieu, and to be accused was in those times almost the same thing as being condemned. Desault, whose fame has been eclipsed by the brilliance of his pupil Bichat, was the first surgeon to teach surgical anatomy after the modern manner, although the great French hospital where he practiced was described at that time as 'the oldest, largest, richest, and worst hospital in Europe.' I need not refer to more recent and greatly honored names—Dupuytren, Velpeau, Nélaton, and many others.

In Germany, even so recently as 100 years ago, surgery was at a low ebb. George Fischer tells us that quacks of all kinds, 'cutters' for stone and hernia, cataract operators, and bonesetters, flourished in the land. The public executioner, whose business it was to fracture bones and dislocate joints on the rack, was supposed thereby to have acquired a knowledge of disorders of these parts, and was consulted freely about them—so much so that Frederick the Great in 1744 published a decree limiting the powers of these men, and while permitting them to treat fractures, wounds and ulcers, forbade them to practice medicine. Hildanus (1560–1634), who lived in Germany at the end of the sixteenth and beginning of the seventeenth century, has been called the Father of German surgery. He was a voluminous writer, a bold operator and his *Opera Omnia* was a work of reference for many years. Heister (1683–1758), a surgeon of much note in the eighteenth century, wrote a *General Surgery*, which enjoyed much repute, and was translated into English. Bilguer (1720–1796), a surgeon-general in the German army was noted for opposing the indiscriminate amputation of limbs then in vogue for gunshot fracture of the extremities, which his predecessor Schmucker had warmly advocated and practiced to an inordinate extent.

Towards the end of the eighteenth century Von Siebold (1736–1807), a famous surgeon, who enjoyed great repute as a clinical teacher and operator, taught anatomy at Würzburg and about the same time Richter (1742–1812) was Professor of Surgery at Göttingen. Richter had travelled much, was familiar with the work done in England and France, and was the best writer and teacher of his day. He was the first to place surgery in Germany on a truly scientific basis. Of those German surgeons whose names still fill our ears with their fame, and whose loss we have recently deplored — Stromeyer, Langenbeck, Billroth, Volkmann, Thiersch, Nussbaum and others—I could only repeat what all of you know as well as or better than I.

The first English surgeon of whom we possess any definite knowledge, and whose writings are still in existence, is John of Arderne. He was born in 1307. He must have been an accurate and close observer, to judge by the graphic description he furnishes of cancer of the rectum. He says:

It breeds within the fundament with great hardness, but with little pain. After a time it is ulcerat, oftentimes all the circumference, and the excrement goeth out continuallie.

He gives a true and telling description of how the condition is to be diagnosed, and of the progress and termination of the disease.

It is noteworthy how many of the older surgeons who attained eminence spent part of their career in the army or navy. William Clowes (1540–1604), who was Surgeon to St. Bartholomew's, had been surgeon in the navy, and wrote *A Proved Practice for all Young Chirurgeons concerning Burnings with Gunpowder and Wounds made with Gunshot*, and he refers to Ambroise Paré in terms of admiration.

The greatest English surgeon of the seventeenth century was Richard Wiseman (1622–1676). He served in the Dutch navy till 1644, and then entered the army of Charles I. Afterwards he spent three or four years in the Spanish navy, and on the Restoration joined the forces of Charles II., by whom he was appointed one of his surgeons. He published many treatises, which exercised a considerable influence on English surgery, but were little known abroad.

William Cheselden (1688–1752) was a surgeon of great renown in England in the early part of the eighteenth century. He was Surgeon and Lecturer at St. Thomas's Hospital. In 1723 he published a treatise on the high operation for stone, but he soon abandoned this for the lateral method, which he so much perfected and improved that the operation remains at the present time much as he left it.

Percivall Pott (1714–1788) was the famous English surgeon of the middle portion of the last century. He was Surgeon to St. Bartholomew's Hospital, and made many and most important contributions to surgery, especially on hernia and on injuries to the head. His name remains attached to many surgical disorders.

Of John Hunter (1728–1793) no detailed mention is required here. His memory and his methods continue a living influence amongst us. He made our surgery a science, and has given to us in our Museum an imperishable memorial of his industry. In it are illustrated those marvellous powers of observation which had never before been equalled, and will never in all probability be surpassed. So long as surgery continues, Hunter's influence must be felt. It is witnessed in the creation of so many distinguished disciples imbued with his principles and able to expound his doctrines. He embodies and represents the glory of our science, our College, and our country.

The historical summary I have attempted would not be complete without some account of the connection existing between the Surgeons and the City of London, which appears to have continued quite without interruption since the middle of the fourteenth century until the foundation of the Surgeons' Company in 1745. There are many entries in the City records of the admission by the Lord Mayor of surgeons and master surgeons to practice in the City of London, and the license thus granted exacted a promise "that they should well and truly serve the people in their cures, and report to the Lord Mayor and Aldermen any surgeon neglecting his patients."

In 1416 the Craft of Barbers practising surgery petitioned the Lord Mayor and Aldermen "to provide a sure remedy against unskilful persons who indiscreetly pretended to be wiser than the Masters of Surgery, and who expose the sick to the greatest danger of death or maim by their presumption." The City took immediate and, as we learn, successful action on this petition.

The City recognized the distinction between barbers and surgeons, for they appointed masters of surgery to control those practising surgery only, and other masters were annually selected to super-

vise those practising barbery. Early in the fifteenth century the surgeons appear as a distinct body, and in 1423 a College of Physicians and Surgeons, which had been founded chiefly through the influence of John Morstede, a surgeon who accompanied Henry V. to Agincourt, was formally sanctioned by the Lord Mayor, and powers granted to it to examine and control persons practising medicine and surgery in the City of London. The Livery Company of Barber-Surgeons was founded in 1540, and its Hall in Monkswell Street is still standing, and it escaped destruction in the Great Fire of London. The famous picture of Hans Holbein of Henry VIII. delivering the Charter of the Company to the assembled barber-surgeons is still there, where until recently one might see the old theater, where lessons in anatomy were read upon the bodies of executed malefactors.

Thomas Vicary (149(?)-1561), Sergeant-Surgeon to the King, the first Master of this Company, was a wise and honest gentleman. He held a unique position at St. Bartholomew's, and there is in Holbein's picture at the Barber Surgeons' Hall a characteristic portrait of him. Vicary was succeeded by Thomas Gale (1507-1587), who had served with the army of Henry VIII. in France in 1544, and under Philip II. of Spain in 1577. In his *Institutions of Chirurgeons* there is an account of wounds made by gunshot. He opposed the view that they are poisoned, and gives cases to prove that bullets may be left for long in the body without danger.

The Barber-Surgeons appear to have borne their due share in the City pageants. At one given at the Restoration, the Lord Mayor and aldermen appointed that the Company should provide "twelve of the most grave and comlyest personages, appareled with velvet coats, sleeves of the same, and chaynes of gold, to attend the Lord Mayor on horseback."

Mr. Edward Arris, an Alderman and Barber-Surgeon, had a great desire to increase the knowledge of Chirurgery, and to this intent bequeathed to the Company a sum to found lectures, in 1645, on anatomy, on condition that a 'humane' body should once in every year be publicly dissected. The Gale Lecture was founded by John Gale a little later, in 1655, and Havers, well known for his description of the canals in bone, since called Haversian, was appointed the first reader. The Arris and Gale Lectures are still annually delivered in this College, for when the Surgeons finally separated from the Barbers in 1745 they carried nothing with them but the Arris and Gale bequests. The hall, library, and plate remained the property of the Barbers, and the new Company of Surgeons had to make a fresh start in the world.

The Act of Parliament separating the Surgeons from the Barbers became a law in 1745, and a Corporation was established consisting of a master, governors, and Commonalty of the Art and Science of Surgery in London.

John Ranby, one of the prime movers in effecting the change, became the first Master. He was Sergeant-Surgeon to George II., and accompanied that monarch to the battle of Dettingen in 1743. The other active mover was Cheselden, Surgeon to Queen Charlotte's, to Chelsea, and St. Thomas's Hospitals. The first meeting of the new Company was held in the Stationers' Hall, July 1, 1745. Mr. Ranby, as Master, occupied the chair, and Mr. Cheselden and Mr. Sandford were his wardens.

Ten examiners were appointed to conduct the examinations of those seeking the diploma of the newly-constituted Company, and this number is continued in the present Court of Examiners. Part of their duty was to examine surgeons for His Majesty's army and navy, and the examination of

surgeons for those services, which had been instituted in the reign of Henry VIII., was continued for a long time by the Court of Examiners until other arrangements were made at a comparatively recent date. It was for this examination, I may note in passing, that Oliver Goldsmith presented himself in order to qualify as a naval surgeon's mate, December 21, 1758. He was unsuccessful, and it was well perhaps, since he could scarcely have written *The Vicar of Wakefield* in the cockpit of a man-of-war. In *Roderick Random* we possess a graphic and probably fairly correct description of one of these examinations, derived, doubtless, from Smollett's personal experience, as he obtained the Company's diploma for a post of surgeon in His Majesty's navy.

The Surgeons established themselves in the Old Bailey, and there they built a theater. In 1753 Percivall Pott and John Hunter were chosen as the first Masters in Anatomy, and no more brilliant choice could have been made. It is recorded that immediately after this election the Court proceeded to discuss how they should dispose of the bodies of three persons who were to be executed a few days afterwards for 'murder,' and then sent to the College theater to be dissected. Amongst these brought in this way was that of Lord Ferrers, executed in 1760 for killing his steward. It was not, however, dissected, but buried in Old St. Pancras Churchyard at the intercession of Lady Huntington.

On July 7, 1796, Henry Cline the elder was elected a member of the Court, but, as it subsequently turned out, the meeting at which this occurred was irregular, and its proceedings illegal, a properly constituted quorum not being present. Although only a technical illegality had taken place, this incident led to the final extinction of the Company of Surgeons, for a bill shortly afterwards introduced into Parliament to legalize the proceeding was thrown out, and the Company was thereupon dissolved. The bill passed the Commons, but was rejected in the Lords, mainly through the influence of Lord Thurlow, who was bitterly opposed to Mr. Gunning, a very distinguished surgeon, and at the time Master. "There is no more science in surgery," Lord Thurlow is reported to have said, "than there is in butchery." "Then," replied Gunning, "I heartily pray your lordship may break your leg and have only a butcher to set it, and my lord will then find out the difference between butchery and surgery."

In 1796 the Surgeons migrated from the Old Bailey to Lincoln's Inn Fields. In that year a new bill they sought for was rejected in the Lords on the ground that the College premises were too far removed from the place of execution, and that it would be indecent and improper to carry the bodies of deceased criminals so long a distance through the streets of London. Finally, the Court in 1797 decided to apply to the Crown, and not to Parliament, for a new charter, and, although opposition was again offered, it proved unsuccessful, and March 22, 1800, the Royal College of Surgeons in London was established by charter of King George III. This charter gave the College its former rights on condition of resigning its municipal privileges. The titles of Master and Governors were retained for a time, but a supplementary charter from King George IV. in 1821 replaced these by those of President and Vice-Presidents. In 1843 another charter, granted by Her Majesty Queen Victoria, changed the title to that of 'Royal College of Surgeons of England,' with a President, two Vice-Presidents, Council, Fellows, and Members, as they exist at the present time. Thus it was that the Royal College of Surgeons of England was created.

During the century of its existence this College has witnessed discoveries which have profoundly changed the character of

surgical practice and the scope of surgical aspirations. An immense development has been effected in the operative surgery of every region of the body, and the victories of the surgeon over disease and death are without end.

John Hunter, and many of the older surgeons, regarded operations as somewhat of an opprobrium to surgery, and as a confession of failure. How far otherwise it is now! Intracranial, intrathoracic, and intra-abdominal operations are successfully carried out, many of them by proceedings which had never previously been imagined, even by the boldest amongst us. A great impetus has been given to conservative methods in surgery, and the preservation of life and limb is now attainable in cases innumerable, and of the most different description, where conservation was previously regarded as impossible.

How largely also have physicians and surgeons alike developed and cultivated that highest form of conservation, the conservation of the race in the happiness and vigor which are associated with physical health!

Plastic methods have been perfected in an extraordinary degree. I would only mention as a striking, although common example, the union of the ends of an accidentally divided nerve and the re-establishment of its function.

Although the number and variety of operations have multiplied a hundredfold, the skill and fertility of resource exhibited in their performance have equally increased and the measure of success which has been realized, whilst it rewards and gratifies the surgeon, will appear even to the educated layman as little short of miraculous. In the early part of the century the surgeon knew of but a limited number of operations, and for the most part those only were performed which appeared to be inevitable. He knew by sad experience how generally fatal important operations and cases of severe injury were when treated in hospital wards. His patients were more then decimated by infective diseases—pyæmia, septicæmia, erysipelas, tetanus, and by suppuration, hectic and gangrene. He recognized and could to some extent control these scourges, but of any effective manner of dealing with them he knew nothing. Now we possess an intimate knowledge of the essential causes of many of these diseases, and if we cannot always cure them we can do much to prevent them. Some things have hitherto baffled our efforts. The cause and the cure of cancer are as yet unknown. We possess some crude ideas about the exciting causes of the disease, and attempt with indifferent success to cure it by timely extirpation. Let us hope that the new century will still be young when some surer means of dealing with this terrible and increasing malady is discovered.

A notable feature of our time is the development of the museums which are now attached to most of our public institutions. Those which more immediately concern ourselves illustrate everything within the range of biological science, and foremost amongst them all is our own great collection.

Much more might one say—and much certainly there is to say—but I will only repeat that our welcome to you all is sincere and heartfelt, and most especially so to our foreign colleagues. Our science knows no narrow national boundary. It is the common property of us all. We desire to sympathize with our fellow-workers abroad, and to appreciate their work, as we trust and believe that they appreciate ours.

In this address I have ventured to urge that we are much beholden to those who have gone before. In but a few years all who are now present will also belong to the past. Let us hope that, as we have not altogether forgotten those who preceded us,

we too may be remembered a little by those who are to follow.

On great occasions like the present, the older seats of learning and other public institutions had power to grant honorary distinctions. Formerly we possessed no such faculty, but by the act of Her Gracious Majesty we, too, have recently obtained permission to grant a certain number of Honorary Fellowships of this College. The Fellowship is the greatest distinction it is in our power to bestow, and we regard it as the highest purely surgical qualification obtainable in this country. It is, therefore, a great privilege and pleasure for me to present, on behalf of this College, this high honor to those distinguished men who are about to receive it.

I am sure also all present will be gratified to learn that His Royal Highness the Prince of Wales has graciously consented to become the first of our Honorary Fellows. His Royal Highness has always shown his interest in the College, and has evinced a special care for the success of its Centenary. It is quite fitting, therefore, that his Royal Highness, who is the patron of so many learned and scientific societies, should add the lustre of his name to the Royal College of Surgeons of England.

WILLIAM MACCORMAC.

CHEMISTRY AT THE NEW YORK MEETING OF THE AMERICAN ASSOCIATION.

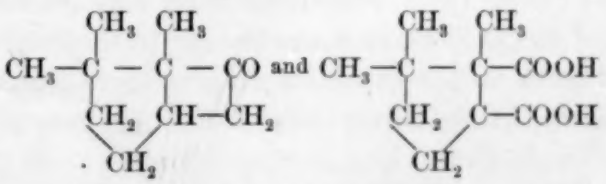
As has been the practice for a number of years Section C met throughout the New York meeting in joint session with the American Chemical Society. The sessions took place in Havemeyer Hall, Columbia University, with the exception of those on the second day of the meeting, which were held at the Chemists' Club of New York City by special invitation of its officers.

At the opening session of the Section, after the election of the usual officers, a report of the Committee on Indexing Chemical Literature was presented, in which the completion of some new important indexes was announced. This report has been already published in this JOURNAL. A resolution relating to the establishment of a National Standards Bureau, submitted by the President of the American Chemical Society, was endorsed by the Section and referred to the Council of the Association.

The address of the Vice-President, Dr. Jas. Lewis Howe, on the 'Eighth Group of the Periodic System and some of its Problems,' has been already published in full in SCIENCE (see the July 6th number).

A large number of valuable scientific papers were presented. As is always the case, many of them, though important, were of a specialized or technical character. Only a few of those having a more general interest can be referred to here.

First may be mentioned the address of Dr. W. A. Noyes on the 'Structure and Configuration of Camphor and its Derivatives,' consisting of a historical review of the previous work bearing on the subject and a brief account of his own remarkable and difficult syntheses of compounds closely related to camphor, and of the establishment of their identity with products obtained directly from it. By his investigations, the correctness of the formulæ for camphor and camphoric acid suggested by Bouveault and Perkin respectively, viz:



seems to have been placed beyond a reasonable doubt. Two other points connected with the investigation deserve special mention; first, the isolation of an optically active acid containing *no* asymmetrical carbon atom, its activity being due to the asymmetrical structure of a ring containing a double-union; and, second, the method

used for establishing the identity of two compounds from different sources consisting in determining whether any change of melting point occurs on mixing the two substances—a far more reliable criterion than mere identity of melting point. Though this method has been used before it is not commonly employed.

Reference should also be made to the beautiful investigation of Dr. A. S. Wheeler on the reduction-products of dehydromucic acid, who has prepared the various stereoisomers of the hydrogenated acids; also to the extended researches of Professor C. F. Mabery and his co-workers on the composition and characteristics of the products obtained from petroleums of different origins.

An interesting account was given by Mr. C. L. Reese of the recently developed process of manufacture of sulphuric acid by the direct union of sulphur dioxide and oxygen through contact with finely divided platinum. The preparation and regeneration of the contact-mass was minutely described, as well as other details of the manufacture, which is at present being carried on industrially on a fairly large scale. Samples of the contact-mass were exhibited, and a striking lecture experiment illustrating the formation of the trioxide by means of it was shown by the speaker.

Professor W. O. Atwater gave an interesting description of the results obtained with his respiration calorimeter on the income and outgo of matter and energy in the bodies of men under experiment, proving that the Law of the Conservation of Energy is applicable to the human organism.

Much discussion was excited by the papers read by Professor Louis Kahlenberg who presented a series of experimental results of various kinds, with which, according to his interpretation, the Theory of Electrolytic Dissociation is inconsistent. The validity of his arguments was, however, called in question, and the great value and wide scope of that theory strongly emphasized by some other members of the section.

The following is a complete list of the titles of the articles presented:

Some Results of Experiments with the Respiration Calorimeter: By W. O. Atwater, Middletown, Conn.

Experiments with some Substituted Benzoic Acids and their Nitriles: By Marston Taylor Bogert and August Henry Gotthelf.

The Direct Synthesis of Ketodihydroquinazolins from Orthoamido acids: By Marston Taylor Bogert and August Henry Gotthelf.

The Direct Preparation of Imides of the Bibasic Acids from the Corresponding Nitriles: By Marston Taylor Bogert.

On Certain Reactions in Liquid Ammonia: By Edward C. Franklin and Orin F. Stafford, Lawrence, Kan.

Notes on the Constituents of Ligament and Tendon: By William J. Gies, New York City.

The Adulteration and Methods of Analysis of the Arsenical Insecticides: By J. K. Haywood, Washington, D. C.

The Composition and Analysis of London Purple: By J. K. Haywood, Washington, D. C.

On some Derivatives of Phenyl Ether: By H. W. Hillyer, Madison, Wis.

A Plea for the Use of the Thermostat for the Laboratory Room: By Arthur John Hopkins, Amherst, Mass.

Crystallization of Copper Sulphate for Quantitative Analysis: By Arthur John Hopkins, Amherst, Mass.

Apparatus for dispensing with the Assistant during Calibration by Telescope: By Arthur John Hopkins, Amherst, Mass.

The Theory of Electrolytic Dissociation as viewed in the Light of Facts recently ascertained: By Louis Kahlenberg, Madison, Wis.

The Toxic Action of Solutions of Acid Sodium Salts on Lupinus Albus: By Louis Kahlenberg and Rollan M. Austin, Madison, Wis.

The Toxic Action of Solutions of the Leech and the Vinegar Eel: By Louis Kahlenberg and John B. Emerson, Madison, Wis.

The Toxic Action of Electrolytes upon Fishes: By Louis Kahlenberg and Hugo F. Mehl, Madison, Wis.

Differences of Potential between Metals and Non-aqueous Solutions of their Salts: By Louis Kahlenberg, Madison, Wis.

I. *The Chlorine Derivatives of the Hydrocarbons in California Petroleum.*

II. *Determination of the formulas of the Hydrocarbons and Chlorine Derivatives of Pennsylvania, California, Japanese, and Canadian Petroleum by Molecular Refraction:* By C. F. MABERY and O. J. SIEPLEIN Cleveland, Ohio.

I. *Composition of the Hydrocarbons in Pennsylvania Petroleum, Liquids and Solids, above 216°.*

II. *Composition of the Hydrocarbons in California Petroleum, Liquids.*

III. *Composition of the Nitrogen Compounds in California Petroleum:* By CHARLES F. MABERY, Cleveland, Ohio.

Composition of the Hydrocarbons in Japanese Petroleum: By C. F. MABERY and S. TAKANO, Cleveland, Ohio.

The Sulphur Compounds and their Oxidation Products and Unsaturated Hydrocarbons in Canadian Petroleum: By C. F. MABERY and W. O. QUAYLE, Cleveland, Ohio.

The Structure and Configuration of Camphor and its Derivatives: By W. A. NOYES, Terre Haute, Ind.

Some Compounds of Methyl Sulphide with Metallic Halides: By FRANCIS C. PHILLIPS, Allegheny, Pa.

The Reaction of Potassium Hydroxide on Chloroform: By A. P. SAUNDERS, Clinton, N. Y.

Application of Chemical Methods to the testing of Wheat Flour: By HARRY SNYDER, St. Anthony Park, Minnesota.

A New Volumetric Method for the Determination of Silver: By LAUNCELOT W. ANDREWS, Iowa City, Iowa. (The paper will be published in the *American Chemical Journal.*)

Method for the Analysis of Glass: By E. C. UHLIG.

Notes on the Ferrocyanides of Lead and Cadmium: By EDMUND H. MILLER, and HENRY FISHER.

Notes on the Determination of the Spontaneous Combustion of Oils when Mixed with Wool Waste: By LEONARD P. KINNICUTT and HERMAN W. HAYNES, Worcester, Mass.

Investigation as to the Nature of Corn Oils. Second paper: *Determination of the Constitution:* By HERMAN T. VULTE and HARRIETT WINFIELD GIBSON.

Notes on the Determination of Phosphorus as Phosphomolybdic Anhydride: By H. C. SHERMAN and H. S. J. HYDE.

New Methods for the Separation of some Constituents of Ossein: By WM. J. GIES.

Texas Petroleum: By H. W. HARPER.

The Hydrogen Reduction Products of Dehydromucic Acid: By A. S. WHEELER, Cambridge, Mass.

ARTHUR A. NOYES,
Secretary, Section C.

ANTHROPOLOGY AT THE NEW YORK MEETING OF THE AMERICAN ASSOCIATION.

THE anthropologists met for organization in Schermerhorn Hall, Columbia University, on Monday, June 25th, at twelve o'clock, Vice-President Amos W. Butler, of Indianapolis, presided at this and subsequent sessions excepting that of Tuesday morning. Dr. J. Walter Fewkes, Miss Alice C. Fletcher and Mr. M. H. Saville were elected members of the Sectional Committee; Professor Joseph Jastrow—whose resignation later caused a vacancy that was filled by the election of Mr. Stansbury Hagar—was elected a member of the General Committee, and Mr. George G. McCurdy was elected press secretary. As Vice-President Butler's address is to be delivered at the meeting of 1901, the Section adjourned on Monday afternoon to allow the members an opportunity to hear the Vice-Presidential addresses that were given at three and four o'clock before other Sections.

Arrangements having been made for a meeting with the American Psychological Association, the morning session of Tuesday, June 26th, was presided over by Professor Joseph Jastrow, president of that Association, and four papers upon psychologic subjects were read. The undesirability of meetings of Section H being held in conjunction with those of the Psychological Association has been ably shown by the secretary of the Columbus Meeting in his report in this JOURNAL. In the opinion of the present writer and that of the majority of the Sectional Committee it is eminently desirable that close affiliation continue between the Anthropologists and the Psychologists; but the presentation of papers whose subject matter ranges from experimental psychology to metaphysics before the anthropologic Section has not proved satisfactory. If the psychologists are to continue in the Association they should

have a separate section. In college curricula psychology is much more widely recognized than is anthropology, there would seem to be no logical grounds for making psychology an outrider for Section H in the American Association for the Advancement of Science.

Henry Davies read a paper upon 'Methods of Æsthetics'; Edward Thorndike one upon 'Practice.' J. McK. Cattell illustrated a new method of demonstrating physiological processes that are dependent upon mental conditions. The stereopticon was used to show upon the screen the tracings made upon a revolving disk of smoked glass. Thus the quantitative character of breathing, muscular fatigue, etc., were shown to the audience as they took place. Charles H. Judd reported upon his 'Studies in Vocal Expression.' Records upon smoked paper were shown that had been made by a diaphragm and enlarging lever. Measurements of two hundred and fifty metrical feet, English hexameter, demonstrated that the theory that English metrical feet are all of uniform temporal quantity must be rejected.

The afternoon session opened with a paper by Dr. Thomas Wilson upon 'Criminology.' He traced the historical development of his subject from the time of John Howard down to the present. The speaker expressed his dissatisfaction with the manner in which crime had been treated in America. It has been clearly defined and the criminal punished, but due heed has not been given to causes and methods of prevention. Dr. Wilson argued that Lombroso's theories, associating certain types of crime with definite physical characters, were based upon unreliable statistics. It would be more correct to say that crime determines the physical structure than *vice versa*, that environment is more responsible for crime than hereditary character. In conclusion, accurate and extensive statistics are desired. Methods for securing these are being developed, such, for example, as described in the succeeding paper by Vice-President Butler.

In an exposition of 'A Method of Registration for certain Anthropologic Data,' Mr. Butler outlined the developments of a method of obtaining and recording facts regarding defectives, delinquents, and dependents. The system was developed and is in use in the office of the Indiana Board of State Charities. Samples of the blanks and records were shown.

Professor Otis T. Mason's paper upon 'The Trap: a Study in Aboriginal Psychology' contained a classification of the various forms of instruments employed by the aboriginal Americans to secure animals. The mental capacities of the inhabitants of the several culture areas, as determined by their skill in devising, killing or capturing apparatus, were compared.

W. H. Holmes gave a brief exposition of 'The Ancient Aztec Obsidian Mines of the State of Hidalgo, Mexico.' The use of obsidian for the manufacture of implements was very common throughout Mexico. The only mine of importance so far discovered is that of Hidalgo, a hundred miles northeast of the City of Mexico. The work on this site has been very extensive and the pittings cover at least one square mile. The quarries were worked mainly for the securing of cores or nuclei for making flake knives, thousands of the rejected cores being found in the quarries. That the mines were worked by Aztecs is shown by the fact that typical Aztec pottery is distributed through the debris of the work-shop.

Geo. G. MacCurdy followed with a paper upon 'The Obsidian Razor of the Aztecs.' The differences between the fracture of flint and obsidian were described and the excellence of obsidian as a material for the manufacture of knives and razors was demonstrated by lantern views.

A paper by Dr. Washington Matthews gave a brief account of the progress made by the Navahos in the art of weaving blankets and then called attention to a new style of weaving that is described by his title—'A two-faced Navaho Blanket.' The web has totally different figures on the two sides. These blankets are not numerous and the art of weaving them is not encouraged by the traders to whom the Navahos sell the products of their looms.

Harlan I. Smith reported upon the progress made by the party of archæologists under his direction working in the interests of the Jesup North Pacific Expedition in 1899. Shell heaps, cairns and graves were examined in Washington and British Columbia. The results of these investigations were described and in part illustrated by lantern views.

A second paper by Mr. Smith described the cairns of southeastern Vancouver Island and the adjacent coasts. These cairns consist of rude stone vaults containing flexed skeletons that have been buried without the implements and utensils that are usually deposited with the dead by the aborigines.

Alice C. Fletcher presented a valuable paper entitled 'Giving Thanks; a Pawnee Ceremony.' The ceremony was witnessed by the speaker, May 20, 1900, in a Pawnee camp in Oklahoma Territory. The rite is described and three points indicated upon which it throws light. (1) The native belief as to the causes which secure efficacy to the medicine administered. (2) The intermediary position of the doctor. (3) The meaning and purpose of the fees given him for his services.

The paper by Francis La Flesche described the proceedings of 'The Shell Society among the Omaha,' as witnessed by the author when a boy and as he understood it from the accounts of the secret ritual during the past year by the older members of the Society.

Mrs. Zelia Nuttall exhibited a cast of Kollmann's reconstruction of the head of a woman of the Swiss Lake-Dweller type, and commented upon the difficulties in the way of a successful reproduction.

The program for Wednesday closed with the paper by Roland Steiner upon 'Braziel Robinson; possessed of two spirits.' This account of a negro superstition is but one of several score of interesting folk-lore tales that Dr. Steiner has collected.

W J McGee opened the morning session of Thursday with an address upon 'The Responsivity of Mind,' a discussion of cultural coincidences in the Old World and the New that lend support to the doctrine of mental unity among mankind.

'The Law of Conjugal Conation' was explained by the same speaker, who emphasized the importance of the rôle played by personal affection in human development.

Charles E. Slocum exemplified the thesis that 'A Civilized Heredity is stronger than a Savage Environment,' in the story of Frances Slocum abducted by the Delaware Indians, at the age of five years, and remaining with them until her death, sixty-eight years afterward. Her character furnishes strong evidence in favor of the importance of heredity. "She was plain and practical in outward display, while in the midst of those inclined to gaudiness; she was free from enervating habits, though in the midst of indulgences; industrious, where idleness abounded; cleanly, while surrounded by squalor; accumulative, among a wasteful race; considerative and sound of judgment, in the midst of impulsiveness; and patient in doing her duty according to the best of her knowledge." Thus it was shown that her English ancestry was a stronger factor in molding her character than her savage environment.

'The Sedna Cycle, a Study in Myth Evolution,' was presented by H. Newell Wardle.

The aim of this study was to show the real character of the ideas that the Inuit fancy has woven into the song and story of the Sedna group, to trace their changes from tribe to tribe and to learn the reasons for their variation.

The author comes to the conclusion that subsequent to the rise of the proto-Sedna myth, the crossing of the arctic circle brought the diurnal and annual myths into close relation when the recognition of their affinity resulted in a mutual borrowing.

'The Peruvian Star-chart of Sulcamayhua' was discussed by Stansbury Hagur. About thirty years ago a group of manuscripts relating to early Peruvian culture was discovered in the National Library of Madrid. Among them was an account of the antiquities of Peru, written about 1610 by Salcamayhua, and containing a stellar chart which is a veritable key to the symbolical astronomy of the Inca empire.

The two oblique lines at the top represent the sky. Immediately below appear the five stars of the Southern Cross, and below them the figure of a large egg, symbol of the Universal Spirit. On the left is seen the sun as a man above the morning star, and on the right the moon as a woman with the evening star beneath. On the lower part of the chart are the twelve signs of the zodiac.

W. K. Moorehead gave a brief review of the facts that he had recently ascertained regarding 'The Bird Stone Ceremonial.' A more detailed study of this class of ornaments was urged and their peculiarities indicated by an exhibition of original specimens.

'A Navaho Initiation' was described by Washington Matthews. The Navahos rarely punish their children, but they frighten them with the masked characters of the Night Chant, the principal one of which is the Yayhichy or maternal grandfather of the gods. When children are naughty they tell them that this person will punish them. At their initiation "they are subjected to a symbolic punishment, after which the supposed gods unmask and show themselves to be ordinary individuals masquerading." The children are then permitted to look through the eyeholes and learn the nature of the mask. They acquire certain privileges at this time.

The sessions on Friday, June 29th, were held in the lecture room of the Department of Anthropology of the American Museum of Natural History. M. H. Saville read a paper upon the ancient tombs at Mitla, Mexico.

Mrs. Zelia Nuttall explained the 'meaning of the ancient Mexican calendar stone,' showing that a single primitive, cosmical scheme and plan of government prevailed throughout ancient America. The author has furthermore ascertained that the American scheme is identical with that carried out in remotest antiquity by the peoples of the old world. The great calendar stone was shown to be the most elaborate representation known of the cosmical plan, which formed the common basis of the ancient civilizations of the old and new worlds.

F. W. Putnam exhibited a 'new type of pottery from Texas.'

The remainder of the day was devoted to the examination of the collections of the museum, which were explained by the curator and his assistants.

On Thursday morning, June 28th, the Council voted to change the name of the 'Committee upon the Study of the White Race in America' to the 'Anthropometric Committee.' This committee provided means for taking measurements upon members of the Association during the meeting.

The 'Committee upon the Introduction of Anthropologic Teaching' was made a standing committee of the Association by the Council. Section H was given authority

to hold a winter meeting at such time and place as the Sectional Committee should decide.

FRANK RUSSELL,
Secretary.

HARVARD UNIVERSITY.

SCIENTIFIC BOOKS.

Etude sur la grêle. Défense des recoltes par le tir du canon. By V. VERMOREL. Librairie du Progrès Agricole et Viticole; Villefranche. July, 1900.

In this pamphlet of 77 pages the well-known viticultural expert and director of the station at Villefranche gives an account of the latest (up to July 1st) phase of the subject of Wetterschiessen—the protection of crops from hail by means of the vertical firing of specially constructed cannon at the threatening clouds. Chapter 1 gives a *résumé* of the various theories of hail-formation, affording striking proof of the uncertainty still existing in this regard, and especially as to the part played by atmospheric electricity in the most damaging hailstorms, viz, those of summer. There follows a brief discussion of the possible explanations of the action of the vertical projection of the annular whirl, which seems to be essential to the production of the effect, and *e. g.*, tears a paper target placed 100 meters from the gun, and according to trigonometric measurements may reach a height of over two kilometers. The claim made, and sustained by an overwhelming number of observations, is that the commotion caused by these whirls in the hail-clouds, if produced in time, will cause rain to fall in place of hail.

Chapter 2 gives abstracts of the reports made to the congress of Italian hail-protection syndicates held at Casale Monteferrato in November, 1899, which was attended by three delegates from France, the author among the number. The reports are from the provinces of Vicenza, Treviso, Verona, Padua, Udine, Pavia, Bergamo, Alexandria and Novara. From all of these regions the reports are very encouraging, in part enthusiastic. The Bergamo reporter sums up by saying that "those who have done the shooting are desirous of continuing it; those outside the defended area regret not having done it. The results obtained this (last) season could not be more encouraging, and will enable us to complete the means of defense." This appears to be substantially the consensus of opinion of those attending the congress.

Chapter 3 gives the details of the construction and handling of the cannon, which does not differ materially from the original prescriptions of Stiger, except in making the gun breech-loading.

Chapter 4 gives details of the desirable organization of the shooting stations, as now established in the Beaujolais, Rhone Valley. Isolated guns are of little value unless placed on high points. Each gun can defend 25 hectares (62 acres); rapid and continuous firing is especially important at the first approach of the cloud. A code of signals is provided to insure concerted and prompt action. The government supplies powder for the purpose at reduced rates. The expense of establishing a station is placed at 11 francs ($2.15) per hectare, or a little less than $1 per acre; current annual expense, about 65 cents per acre, estimating that 500 shots may have to be fired.

Among the striking points noted is that from 2000 stations last year, *fifteen thousand* are in operation in Italy this year. Moreover, the insurance companies heve reduced the premiums 33 per cent. for the areas provided with shooting stations.

Is it not about time that some experiments in the same line were set on foot in our thunderstorm-ridden Middle West? If, as some allege, this is merely a passing popular delusion, it is a remarkably persistent one, backed by very heavy pecuniary investments, and not definitely assailable on scientific grounds.

E. W. HILGARD.

A Brief Guide to the Commoner Butterflies of the Northern United States and Canada. By SAMUEL HUBBARD SCUDDER. New York, Henry Holt & Co. 1899. Pp. xi + 210, 22 plates of wood-cuts, 10 cuts in text.

This book is a reprint of the first edition of the work, published by the same house in 1893, and so far as the reviewer is able to ascertain, is not different in any respect from the first edition, save in the addition of the plates, which were taken for the most part from the

plates, contained in Mr. Scudder's monumental work upon the Butterflies of New England.

The book is a very convenient manual for use on the part of beginners residing in New England and the Middle States, the species treated being for the most part the butterflies commonly found in these sections of our country. The instructions for collecting, rearing, and studying butterflies are brief, but most excellent.

The interest in the study of natural science is rapidly increasing, 'nature study,' so-called, having found a prominent place in the work of our common schools. Such brief compends as these, which are strictly accurate, and adapted to the wants of the ordinary teacher and pupil, are therefore certain to receive favorable attention, and more and more to attract a widening circle of readers and purchasers. The book has already proved its worth, as have all the writings of its learned author, and the issue of this second edition should be cause for congratulation alike to author and publishers.

W. J. Holland.

SCIENTIFIC JOURNALS AND ARTICLES.

The Popular Science Monthly for August has for its frontispiece a portrait of Professor R. S. Woodward, President of the American Association for the Advancement of Science, while the first article, 'Rhythms and Geologic Time,' by G. K. Gilbert, is the address of the recent President of the Association. R. W. Wood describes 'The Photography of Sound Waves,' Havelock Ellis discusses 'The Psychology of Red,' Simon Newcomb continues his 'Chapters on the Stars,' and James Collier has the third of his papers on 'Colonies and the Mother Country.' Carl H. Eigenmann discusses the 'Causes of Degeneration in Blind Fishes,' stating that all indications point to use and disuse as the effective agents in moulding the eye. William Baxter, Jr., treats of 'The Evolution and Present Status of the Automobile,' and A. W. Greely summarizes the 'Scientific Results of the Norwegian Polar Expedition.' The Departments of Discussion and Correspondence, Scientific Literature, and The Progress of Science are well filled.

Bird Lore for August opens with the first instalment of a paper on 'The Orientation of Birds,' by Capt. Gabriel Reynaud, of the French Army, who takes the ground that there is a 'sense of direction.' William Brewster contributes 'A Study of a Lincoln's Sparrow,' and Harry S. Warren treats of 'The Birds that Pass in the Night.' There are numerous notes and book notices. The Editor discusses the proposed agreement with the Millinery Merchants' Protective Association regarding the use of American birds, and Mabel Osgood Wright treats of the same subject under the reports of Audubon Societies, taking the ground that no compromise can be made, that unless all birds can be protected none should be. It is to be feared that we are, on a smaller scale, to have a repetition of the differences existing between prohibitionists and advocates of high license on the liquor question.

Herr Barth, Leipzig, has begun the publication of a journal entitled *Zeitschrift für Tuberkulose und Heilstättwesen* edited by Professors Gerhardt Frankel and von Leiden. The first number contains a series of important articles, including contributions in French and English.

Dr. J. C. Arthur, Purdue University, has retired, owing to ill health and pressure of work, from the position of responsible editor of the *Botanical Gazette* which he has filled for the past fourteen years. The journal is now edited by Professor John M. Coulter and Professor C. R. Barnes, with other members of the botanical staff of the University of Chicago. Professor Arthur becomes an associate editor, the other American associate editors being Professor Robert A. Harper, University of Wisconsin; Professor Volney M. Spalding, University of Michigan; Professor Roland Thaxter, Harvard University, and Professor William Trelease, Missouri Botanical Garden.

DISCUSSION AND CORRESPONDENCE.

INTERNATIONAL CATALOGUE OF SCIENTIFIC LITERATURE.

To the Editor of Science: I am authorized by the Secretary to bring to your attention the fact that, after a number of discussions by scientific representatives of nearly all nations,

it was decided at an International Conference held in London in June, 1900, to publish, beginning with the year 1901, an International Catalogue of Scientific Literature, which is to be issued only in the form of annual volumes at first. The Catalogue is to include both an author and a subject index. It will comprise the following subjects: Mathematics, Mechanics, Physics, Chemistry, Astronomy, Meteorology (including Terrestrial Magnetism), Mineralogy (including Petrology and Crystallography), Geology, Geography (Mathematical and Physical), Paleontology, General Biology, Botany, Zoology, Human Anatomy, Physical Anthropology, Physiology (including Experimental Psychology, Pharmacology and Experimental Pathology), and Bacteriology; in all 17 subjects. At least one volume will be given to each subject, and it is proposed that not all the volumes shall be issued at once, but in four groups, as soon as possible after the first of January, April, July and October respectively. The subscription price for a complete set of the whole Catalogue in 17 volumes is £17, say $85.00.

The Smithsonian Institution has provisionally undertaken to represent the interests of the Catalogue in the United States, and will receive promises of subscriptions. The publication of the Catalogue cannot be undertaken unless subscriptions for about 300 complete sets a year (equivalent to about £5000) *for five years* be guaranteed beforehand. Germany has guaranteed subscriptions to the extent of 45 complete sets (or £750), and the Royal Society of London has guaranteed the same for Great Britain and Ireland; it is hoped that at least an equal number of subscriptions will be guaranteed in the United States. It is most important that the necessary guarantee for subscriptions should be completed before September 30th, at the very latest, hence it is desirable that promises of subscriptions in the United States should be sent in before September 15th.

The prices of individual volumes will be eventually fixed by the Central Bureau, and will vary, but so that the aggregate of the individual volumes will amount to £17. In England the Royal Society is making arrangements by which, in the case of special institutions desiring only parts of the whole Catalogue, the subscription for a complete set may be divided among them. It is learned that subscriptions to about 90 sets are yet required, and of these, besides the 45 sets guaranteed by the Royal Society, a Fellow of that Society has guaranteed 45 additional sets on condition that the United States would subscribe for a like amount. It thus appears that the success of this undertaking now depends upon the subscriptions received in this country.

Very respectfully yours,

RICHARD RATHBUN,
Assistant Secretary.

SMITHSONIAN INSTITUTION, August 6, 1900.

THE BUFFALO EXPOSITION.

TO THE EDITOR OF SCIENCE: I should be glad if you would let me call the attention of your readers to the Department of Ethnology and Archæology of the Pan American Exposition.

The exposition has provided a circular building 128 feet in diameter, and has also arranged for a 'Six Nation' Indian exhibit on the grounds, with a representation of the typic 'Long House' of the Iroquois and an attendance of some 60 Indians, who will be engaged in such industries as basket-making, woodwork, etc. As these Indians are pagans, and have preserved to a great degree their ancient customs, they will celebrate in appropriate seasons their various thanksgiving festivals, dances and other rites.

Every precaution will be taken to protect exhibits against fire or theft and loss in packing and unpacking. It is expected, therefore, that a large amount of valuable archæologic material will be placed at the disposal of this department by museums and individual collectors. In fact, it is not too early to assure the public that the promises of such institutions as the American Museum of Natural History, The Peabody Museum, University of Pennsylvania, University of Chicago and the Buffalo Society of Natural Sciences as well as the friendly co-operation of the Ministers of the South American Republics, guarantee the success of this department. At the same time, there is always room for more, and as the aim

of this Department is not so much to get together a large miscellaneous collection of relics as to afford a means of popular instruction in American archæology, it is desired that students from all parts of the country shall send exhibits or memoranda descriptive of results obtained in their special fields of labor. For example, one exhibit will show the animals domesticated by the Aborigines of the Western Continent, and will explain why the lack of large useful animals capable of domestication hampered the development of civilization in the New World.

Through the co-operation of the Department of Agriculture and Horticulture, exhibits will be made of the plants cultivated in both North and South America before the discovery.

Often the placard is of as great value as the specimen, and one of the features of the exhibit will be cases describing in brief various types of stone age implements and the methods of manufacturing them. Any student of American archæology who has elaborated some special phase of the subject and wishes to place his work before the public may send on manuscript, and placards will be made from it, with due credit to the investigator.

A. L. Benedict.

NOTES ON INORGANIC CHEMISTRY.

The first installment of the promised revision of the atomic weight of iron by Professor Theodore W. Richards has appeared in the *Zeitschrift für anorganische Chemie*, the work being done in conjunction with Dr. Gregory P. Baxter. The method used is the reduction of ferric oxid by hydrogen, the temperature used being 900°. The oxid was formed in two different ways: first, by precipitation from ferric nitrate of the hydroxid, which was dehydrated at 900°; second, by direct heating of the nitrate at 900°. The first method gave in two experiments the figure 55.90. The series by the second method —five experiments — gave 55.883. This is slightly lower than the generally accepted figure, 56.0, and the paper discusses briefly possible sources of error in earlier determinations. Further work on other compounds is to be carried out.

A few years ago Krüger described a red solution formed by leading chlorin into an alkaline solution of copper, which was supposed to contain a salt of a cupric acid. This work has been repeated by F. Mawrow and described in the *Zeitschrift für anorganische Chemie*. So far from getting the above results, a brown powder resulted, having the approximate composition of 6 CuO, H_2O. The proportion of active oxygen was never more than a small fraction of a per cent., whether the experiment was carried out at a boiling temperature, or cooled by ice.

In the *Annales de chimie et de physique*, G. Baudran describes a very considerable series of 'tartar emetics,' double tartrates of metals and alkalies, corresponding to the ordinary tartar emetic, potassium antimonyl tartrate. They are generally formed by dissolving the hydroxid of the metal in tartaric acid, and treating the product with an alkaline tartrate. The emetics of manganese, bismuth, iron, aluminum, and chromium were formed, as well as borotartaric acid and potassium borotartrate.

As far back as 1829 a salt was discovered by Zeise, formed by the action of alcohol upon platinum chlorid, which he called acechlorplatin and to which he gave the formula (in modern nomenclature) KCl, C_2H_4, $PtCl_2$, H_2O. For a few years this compound, combustible chlorid of platinum as it was sometimes called, excited much attention, and Liebig and others attacked unsuccessfully the composition proposed by Zeise; but standing alone as it did, with no compounds of analogous character, for more than half a century few workers have noticed it, though Birnbaum in 1868 proved the correctness of Zeise's proposed composition. In 1844 Reiset formed a compound by the action of ammonium nitrate on the salt of Magnus which he considered to be platosammin chlorid, $Pt(NH_3)_2Cl_2$, but which Cossa proved fifty years later was salt of a platosemiammin chlorid, $PtNH_3Cl_2$. Now in the last number of the *Zeitschrift für anorganischen Chemie*, S. M. Jörgensen, who has so enlarged our knowledge of the platinum and other metallic bases, shows the complete analogy between these salts of Zeise and of Cossa, the latter giving a double alkali salt of formula KCl, NH_3, $PtCl_2$, H_2O, which corresponds exactly to a salt of Zeise in which

ethylene is replaced by ammonia. A number of other compounds of these salts were formed and in every case were analogous, in crystallographical character as well as in chemical composition. It is interesting to see two compounds, each of which had appeared for half a century or more to be unique, thus shown to be of the same type, and it is by no means impossible that other salts of this type may yet be discovered.

IN 1886 Linnemann claimed to have discovered in orthite a new metal which he named *austrium*, but this work was never confirmed. Richard P̂ribram has recently repeated the work of Linnemann and concludes, as had Lecoq de Boisbaudran, that austrium is identical with gallium. But he also concludes from a very thorough spectroscopic examination of the same orthite, that there is a new element present which has not yet been isolated, which is entirely distinct from Linnemann's austrium, and to which P̂ribram proposes to give the earlier name austrium.

J. L. H.

---

*THE INTERNATIONAL ASSOCIATION OF ACADEMIES.**

THE Academy will recall the fact that at the conclusion of the mission entrusted to M. Moissan and myself, consent was given to the 'Projet de Statuts pour l'Association internationale des Académies,' drawn up by the delegates of the nine Academies represented at the Conference held at Wiesbaden early in October last, at the invitation of the Academy of Berlin.

The international Association is now constituted; and it includes the eighteen following Academies:

1. Academy of Sciences.....Amsterdam.
2. Prussian Academy of Sciences..Berlin.
3. Academy of Sciences, Literature and the Fine Arts.....Brussels.
4. Hungarian Academy of Science.....Budapest.
5. Academy of Sciences.....Christiania.
6. Society of Sciences.....Göttingen.
7. Academy of Sciences of Denmark.....Copenhagen.
8. Academy of Sciences of Saxony.Leipzig.
9. Royal Society.....London.
10. Academy of Sciences of Bavaria.....Munich.
11. Academy of Inscriptions and Literature.....Paris.
12. Academy of Sciences.....Paris.
13. Academy of Moral and Political Sciences.....Paris.
14. Academy of Sciences.....St. Petersburg.
15. Academy dei Lincei.....Rome.
16. Sweedish Academy of Sciences Stockholm.
17. Academy of Sciences.....Washington.
18. Academy of Sciences.....Vienna.

Amongst the Academies invited to join, one only, the Royal Academy of History of Madrid, has as yet not replied to the request of the Wiesbaden Conference.

The provisional rules take into consideration the possibility of the addition of other learned societies, and in § 2 the conditions and formalities are indicated which will be necessary for the admission of a new Academy.

The Association comprises two Sections, the Section of Literature and the Section of Science. The work will be carried out by general meeting and committee. In principal, the general meeting will be held every three years, and each Academy will send as many delegates as it may deem necessary, but each Academy will have only one vote, which should be given by one of the members of the delegation.

In the interval between two general meetings, the Association is represented by the committee, each Academy being represented on this by one member only, if it concerns itself with only one of the Sections of Literature or Science; it will send two delegates when it is concerned with both Sections. Amongst the eighteen Academies, twelve belong to both Sections and consequently will send two delegates to the committee. Of the other six, four, namely the Royal Society of London, the Academy of Sciences of Paris, the Academy of Stockholm, and the National Academy of Washington, belong to the Section of Science alone, and two, the Academy of Inscriptions and Literature, and the Academy of Moral and Political Sciences, belong to the Section of Literature. Hence the

*Translation in *Nature* of a report made to the Paris Academy of Sciences by M. Darboux, permanent Secretary of the Academy, and published in the *Comptes rendus*.

committee will consist of thirty delegates, of which sixteen will belong to the Section of Science, and fourteen to that of Literature. In full committee the two delegates of one Academy will have only a single vote. After delay, in such cases, all the Academies, with the exception of two or three, have sent in the names of their delegates. The delegates of the principal Academy will take the chair at the committee of the Association, the principal Academy being that of the place in which it is proposed to hold the next general meeting.

The Conference of Wiesbaden having decided on a resolution to which we can here only draw attention, that the first general meeting of the International Association should be held in Paris this year, a difficulty has arisen not foreseen when the provisional rules were drawn up. Three Parisian Academies have joined the Association, it is necessary to decide to which shall be assigned the presidency on this occasion. The delegates of the three Academies of the Institute of France have met, and have unanimously decided to confer for this year the presidency of the Association upon the Academy of Sciences, which was the first to join the Association, and moreover, has taken an active part in the discussions, at the conclusion of which the Association was constituted.

It has been further decided that the first session of the committee shall be held in Paris towards the end of July, the first meeting being fixed for Tuesday, July 31st, at 9:30 a. m., at the Palais de l'Institut.

The agenda for the first meeting will include the preparation of a scheme of government for the committee, the settlement of the exact date and the order of the day for the next general meeting. The Royal Society of London, which has taken so active a part in the formation of the Association, has already announced a scheme which it proposes to submit for approval to this next general meeting; it concerns the measurement of an extended arc of a meridian in the interior of Africa.

The Academy, by the act of joining, has subscribed to the rules of the new Association. There is no occasion to recall here with what prudence and moderation they have been drawn up. The object of the Association is to prepare and promote scientific work of general interest which may be proposed by one of the constitu ent Academies, and generally to facilitate scientific relations between different countries. In any particular case, each Academy reserves to itself the right to give or refuse its support, or decide the choice of methods and the means to be employed.

If these principles are followed, the Association will become a powerful instrument of study, of concord and of scientific progress; it will rapidly take its place in the front rank of those international scientific associations, the *rôle* of which must necessarily be satisfactory.

Faithful to the principles which they have always followed, the three Academies of the Institute of France, called by the nature of their studies into the Association, will strive to assure it the success and influence which have been desired for it by its promoters.

Finally, attention may be directed to a particular clause in the rules which will interest some of our colleagues. For taking into consideration the study or preparation of scientific enterprises or researches of international interest, upon the proposition of one or more of the associated Academies, special international commissions may be instituted either by the general meeting or one of its two Sections or, in the interval between two general meetings, by the committee or one of its two sections.

---

*DEFECTIVE VISION OF BOARD SCHOOL CHILDREN.**

The London School Board have just tabulated the results of a test of the eyesight of school children in the Board schools. The object of the test was not to obtain statistical information or to satisfy scientific curiosity, but to achieve the practical end that children whose distant vision is defective should be placed in the front benches in the class room where they are required to see what is written or drawn on the blackboard. Some interesting results, however, have been obtained which are well worth the consideration of the medical profession and the attention of the parents of the children. The School Board at the end of last year requested the teachers to test the eyesight of the

* From the London *Times*.

children by means of certain testing cards, and to record the results. Sir Charles Elliott, who has taken great interest in the examinations, has appended an explanatory note to the return which has been made.

The manner in which the eyesight test was conducted, he states, was to hang up on the wall of the school, in a good light, the test card for distant vision and to mark on the floor a line at a distance of 20 feet from the wall. At this distance the children were required to read certain lines of letters. It appears, from a summary of the results, that of 338,920 children tested, 259,523, or 76.6 per cent., were found to have good sight, and 79,167, or 23.3 per cent., defective vision. The large number of 2675 children were only able to see the enormous top letter of the test card at a distance of 20 feet—a letter which is meant to be read at a distance of about 200 feet. The 79,167 children were given notices to their parents that they were suffering from 'serious defective vision' and advised to consult an oculist without delay. Taking the figures in the tables by School Board divisions it is seen that by far the largest percentage of defective vision is found in the city, where only 56.6 per cent. of the children have good sight. The other divisions where sight is below the average are Westminster (where the percentage of those having good sight is 67.7), Hackney (73.0), Tower Hamlets (74.0), Finsbury (74.3), and Southwark (74.9). Those in which the eyesight are above the average are Greenwich (which has a percentage of 82.2 having good sight), East Lambeth (78.7), West Lambeth 78.9), Chelsea (77.3), and Marylebone (77.1). In these latter divisions the houses are less dense and there are larger open spaces than elsewhere.

The figures, therefore, as far as they go, seem to bear out the hypothesis of 'town vision' expounded by Mr. Brudenell Carter in 1895, or, in other words, it points to the injury to the sight being caused by living in thickly-populated areas, where the eye has little opportunity of being exercised in distant vision. Another curious result of the test is that the proportion of good sight increases as the children rise in the different standards, which broadly coincide with the ages of the children. The percentage of good vision in Standard I. is 70.8; in II., 74.9; in III., 77.0; in IV., 78.9; in V., 80.3; in VI., 81.3; in VII., 82.9; and in ex-VII., 83.7. So that without a single break the ratio rises with the standard as the age of the children increases. But it may be doubted whether this means an increase in the power to see or only in accuracy of reading. Sir Charles Elliott expresses the belief that the recorded rise is contrary to general medical experience, and throws some doubt on the value of the whole statistics. Mr. Bland, of the Royal London Ophthalmic Hospital, he says, suggests the explanation that the bad results are partly due to weak power of reading rather than weak sight. "The trained eye is better able to discern letters than the untrained eye, and it is probable that the children in the higher standards achieved better results partly on account of their training."

The eyesight of girls appears to be inferior to that of boys, and Mr. Carter, in the inquiry made by him, seems to have arrived at similar results and to be inclined to account for them by the strain of needlework on the eyes of girls. Professor W. Smith, in a note appended to the Board's return, states that he had seen Mr. E. Clark, surgeon to the London Ophthalmic Hospital, in connection with the results, and they agreed that a similar return should be made of the available figures for near vision; that the figures were most interesting and valuable as giving the first experience on a large scale of the extent of defect of vision amongst children of school age; and that the figures showed that rather more than a fourth of the children suffered from defective vision. The London School Board proposes to repeat the test, year by year, in order to secure a correct record being kept of the progressive improvement, or the reverse, in the children's power of distant vision.

PROTECTION OF WILD ANIMALS IN AFRICA.

THE London *Times* has received the following letter, dated May 10th, from a correspondent at Beira, East Africa:

I venture to bring before your notice the pressing danger that before long the districts

which lie behind Beira, and which formerly teemed with game, will be denuded of all game through indiscriminate shooting. When the railway was commenced between Beira and Umtali buffalo existed in vast herds, and hartebeeste, wildebeeste, sable antelope, eland, and many other antelope existed in profusion. The railway is now completed and is simply a line running through the veldt, and would not of itself interfere with the game. At present there is but little game close to the line, but game of all sorts still exists in great but much diminished numbers some few miles away. The reasons for the disappearance of the game are as follows:—

1. The shooting of game for food by the *employés* of the line and the reprehensible practice of shooting for mere slaughter or for horns. In so far as shooting for the pot is concerned this is legitimate, as fresh meat cannot otherwise be obtained. Unfortunately the use of the .303 rifle is harmful, as animals are more frequently wounded by this rifle than killed, and go off into the veldt to die. Even with the soft-nosed or Jeffrey split bullet the shock is not severe enough to always bring the animal down and therefore this rifle compares unfavorably with the old Martini-Henry. The magazine .303 is simply a temptation to slaughter. During the past two years there have been a large number of *employés*, and the canteens have been pushed for food. It is the practice of canteen keepers at Bamboo Creek, which is in the center of the game district, to send not only white hunters but also natives to shoot; obviously the result is disastrous.

2. The advent of numerous hunting parties in the season, which extends from about June to December, during the early part of which many of the antelope are in young. These parties without exception go in for indiscriminate slaughter, and if allowed to continue will denude the whole country of game.

3. The rinderpest, which visited this country in 1898, killed off thousands of the buffalo, and nearly exterminated the eland and sable antelope.

The district in question is not cultivated and can only be of use as a hunting district. I have reason to believe that if properly approached, the Mozambique Company would be willing to establish a close season, or even close down the shooting for four or five years. There has now been established in Beira a cold storage company which will shortly commence operations, and thus every one on the line will obtain meat. Also after this year, the contract for the railway having been completed, there will be a far smaller population requiring meat.

Last year, owing to a very prolonged rainy season and the disturbed state of South Africa, there were very few hunting parties, and this year there will be practically none, owing to the war, so that the game have now a chance of increasing in number; but unless another five years of close time are allowed, followed by a rational system of close seasons, they will have but a small chance of getting up to the number they were at only three years ago. This applies especially to the buffalo, eland and sable antelope.

I would suggest that the hunting parties be strictly supervised and limited to a small number of heads; also that a long close season be established, and that buffalo, eland, and sable antelope be made Royal game for some years to come; also that natives be prevented from shooting.

I have reason to believe that the Mozambique Company would not object to employ gamekeepers, but there is no hope of the company ever doing anything on their own initiative.

This part is one of the few accessible spots where the larger kind of antelope can be found and it is more than a pity to see these beautiful animals slaughtered as they are now. In the interest of true sport the indiscriminate shooting of the past three years should be stopped. The months November and December should be the only months in which shooting is allowed. The grass having been burnt off there is less likelihood of wounding instead of killing, and by this time all the young have been dropped.

SCIENTIFIC NOTES AND NEWS.

We wish to call special attention to the letter from Dr. Richard Rathbun, on the International Catalogue of Scientific Literature published

above. It is absolutely necessary that forty-five sets be subscribed for in America, and it is desirable that this be done before the beginning of October.

THE judges who are to select 100 eminent Americans, whose names are to be engraved in the Hall of Fame of the New York University, are ready to receive nominations. The following men of science have been proposed: John Adams Audubon, Spencer F. Baird, Alexander D. Bache, Nathaniel Bowditch, William Chauvenet, Henry Draper, James P. Espy, Asa Gray, Robert Hare, Joseph Henry, Edward Hitchcock, Isaac Lea, Matthew Fontaine Maury, Marie Mitchell, Benjamin Peirce, David Rittenhouse, Benjamin Silliman, Benjamin Thompson, John Torrey. Are any of the readers of this JOURNAL prepared to suggest how many men of science should be included among the 100 most eminent Americans no longer living, and who they should be?

DR. CARL GEGENBAUR, professor of anatomy at the University of Heidelberg, has retired from the active duties of his professorship.

IT will be remembered that at the Twelfth International Medical Congress, held at Moscow in 1897, the city established a prize of $1000 to be conferred at each Congress on the one who since the preceding Congress had done the medical work of the greatest benefit to humanity. The first award of the prize was to M. Henri Dunant, founder of the Red Cross Society. At the present Congress, the award has been made to Professor Rámon y Cajal, for his researches on the minute structure of the nervous system.

THE Faculty of Science of the University of Rome proposes to publish by subscription a complete collection of the works of the late Professor Eugenio Beltrami. It will extend to three or four large volumes, and will be sent to those subscribing $10 or more towards the cost of publication.

THE Berlin Academy of Sciences has made further grants as follows: Dr. Holtermann, Berlin, for a botanical expedition to Ceylon, 4000 Marks; Professor Ludolf Krehl, Greifswald, for experiments on respiration, 1500 Marks; Professor Julius Tafel, Würzburg, for the continuation of his work on electrolysis, 100 Marks; Dr. Benno Wandolleck, Dresden; for the investigation of the morphology of diptera, 800 Marks.

PROFESSOR B. E. FERNOW, of the Cornell College of Forestry, has been appointed delegate to the International Forestry Congress of the Paris Exposition.

PROFESSOR FELIPE VALLE, of Mexico City, connected with the Tacubaya Observatory, is on his way to Europe, where he will represent the Mexican Government at certain of the congresses held during the Paris Exposition.

THE Royal College of Physicians has made the following appointments: Professor Clifford Allbutt, regius professor of physic at Cambridge, will deliver the Harveian oration on October 18th (St. Luke's Day); and Dr. A. E. Garrod, of St. Bartholomew's, the Bradshaw lecture in November. Dr. Henry Head has been appointed the Goulstonian, Dr. J. Frank Payne the Lumleian, and Dr. Halliburton the Croonian lecturer for 1901, and Dr. J. W. Washbourn the Croonian lecturer for 1902.

DR. ADALÁR RICHTER, professor of botany at the University at Klausenberg, has been made director of the Botanical Institute and of the Botanical Garden.

THE Moxon gold medal, of the Royal College of Physicians, founded in 1886 in memory of the late Dr. Walter Moxon, and awarded every third year for distinction in clinical medicine, was awarded to Sir William Tennant Gairdner, M.D., F.R.S., emeritus professor of medicine in the University of Glasgow.

DR. HERMANN A. LOOS died of yellow fever on the steamship *Chile* on July 17th, while on his way to South America. Dr. Loos received the degree of doctor of philosophy from Columbia University this year for work in chemistry and was offered the position of assistant in the University. He was only 24 years of age.

WE regret also to note the deaths of Dr. Johann Kjeldahl, director of the chemical laboratory at Karlsberg, and of Dr. Wilhelm Keck, professor of engineering at Hanover.

THE Comptroller of the City of New York has refused to pay most of the bills presented

by experts in the Mollineux trial. Some of the bills are as follows: Dr. R. A. Witthaus, chemist, $18,550; E. J. Lederle, chemist, $3800; E. S. Potter, a physician, $2450; Dr. Persifor Fraser, handwriting expert, $2181. There are some eight handwriting experts who present bills each larger than a thousand dollars.

The annual meeting of the Corporation of the Marine Biological Laboratory was held at Woods Holl, on Tuesday, August 14th.

The New York *Medical Record* contains a cabled report of the 13th International Medical Congress which met at Paris from the 2d to the 9th of August. M. Lannelongue, president of the Congress, made an opening address which was followed by speeches by the presidents of the National Committees, including Lord Lister, Professor von Bergmann, of Berlin, and Professor Kitasato, of Japan. General addresses before the Congress were made by Professor Virchow, of Berlin, Professor Burdon-Sanderson, of Oxford, and Professor A. Jacobi, of New York. The registration at the Congress numbered 6170 of which 412 were Americans.

We have already called attention to the first International Congress of Physics which opened at Paris on August 6th. The Congress was divided into the seven following sections, which met in the rooms of the Société française de Physique: (1) general questions, instruction, measurements; (2) mechanical and molecular physics; (3) optics; (4) electricity and magnetism; (5) magneto-optics, radio-activity, discharges in gases; (6) cosmical physics; (7) biological physics. *Nature* states that among the subjects dealt with by British physicists are: the movements produced in an indefinite solid by the displacement of a material body, by Lord Kelvin; the constant of gravitation, by Mr. C. V. Boys; the propagation of electricity, by Professor Poynting; electric discharges in gases, by Professor J. J. Thomson; properties of alloys, by Sir W. C. Roberts-Austen; and the unit of heat, by Mr. E. H. Griffiths. In addition there are contributions by Professors Lorentz, van't Hoff, Warburg, Voigt, van der Waals, H. Poincaré, Cornu, Lippmann, Potier, Becquerel, Arrhenius, Exner, Spring, and others.

A telegram has been received at the Harvard College Observatory from Professor J. E. Keeler, at the Lick Observatory, stating that the following elements and ephemeris of comet 1900b were computed by Perrine from observations on July 25th, July 30th and Aug. 4th.

Time of passing perihelion	$= T =$	Aug. 3.21
Perihelion minus node	$= \omega =$	12° 27′
Longitude of node	$= \Omega =$	328° 1′
Inclination	$= i =$	62° 31′
Perihelion distance	$= q =$	1.0148.

Ephemeris.

1900.			1900.	
Aug. 10,	R.A.	$3^h 15^m 16^s$	Decl.	$+63°\ 41'$ Light 0.83
" 14,	"	3 34 44	"	$+72\ 17$
" 18,	"	4 12 28	"	$+79\ 11$
" 22,	"	5 46 24	"	$+84\ 11$ Light 0.43

The U. S. council at St. Gall, Mr. Du Bois, sends to the Department of State the following account of the trial of the Zeppelin air ship: At the invitation of Count Zeppelin, I was present at the trial ascent of his air ship on the afternoon of July 2d at Manzell, on Lake Constance. At 7 o'clock the great ship, 407 feet long and thirty-nine feet in diameter, containing seventeen separate balloon compartments filled with hydrogen gas, was drawn out of the balloon house securely moored to the float. At the moment of the ascent the wind was blowing at a rate of about 26 feet per second, giving the operators a good opportunity of testing the ability of the air wheels to propel the great ship against the wind. The cigar-shaped structure ascended slowly and gracefully to about 30 feet above the raft. The balances were adjusted so as to give the ship an ascending direction. The propellers were set in motion, and the air ship, which has cost considerably over $200,000, started easily on its interesting trial trip. At first, the ship moved east against the wind for about two miles, gracefully turned at an elevation of about 400 feet, and, making a rapid sail to the westward for about five miles, reached an altitude of 1300 feet. It was then turned and headed once more east, and traveling about a mile against the wind blowing at the rate of twenty-six feet per second, suddenly stopped; floating slowly backwards three miles to the west, it sank into the lake, the gondolas resting safely upon the water. The time of the trip was about fifty minutes; distance traveled,

about ten miles; fastest time made, five miles in seventeen and one-half minutes; highest possible revolution of the propellers, 600 per minute. The cause of the sudden stoppage in the flight of the ship was proved to be a slight mishap to the steering apparatus, but the colossus floated gently with the wind until it settled upon the surface of the lake without taking any water. The raft was then brought up and the ship was easily placed upon it and brought back to the balloon house. The weight is 200 centners (22,000 pounds).

A CORRESPONDENT writes to the London *Times:* The International Congress of Hygiene and Demography is to meet this year in Paris from the 10th to the 17th of August, corresponding exactly in date with the meeting held nine years ago in London. Forming as it does one of a succession of congresses that are being held in Paris during the Exposition, it cannot perhaps be expected to arouse the same attention as the meeting in 1891, under the presidency of the Prince of Wales and the chairmanship of Sir Douglas Galton. During the nine years that have passed since the London meeting the science of hygiene has steadily developed, and the reports to be presented to the Paris meeting include questions that had hardly been formulated in 1891, and many that have claimed a great deal of attention in the past few years, such as bacteriology, prevention of tuberculosis, preservatives in food, and school hygiene. The program set out for the nine sections into which the work of the congress is divided covers a very wide field, showing how intimately hygiene enters into every branch of life. The several sections include —(1) bacteriology; (2) hygiene of alimentation, and chemical and veterinary science; (3) engineering and architecture; (4) personal hygiene and the hygiene of communities (schools, hospitals, prisons), cremation; (5) hygiene of professions and trades (unhealthy dwellings); (6) military, naval and colonial hygiene; (7) general and international hygiene, infectious diseases and sanitary legislation and administration; (8) hygiene of travelling and communications (railways, ships, public conveyances); and (9) demography. It is to be wished that there had also been a section for the discussions of poisons used in personal decoration and not only of those used for hair dyes, etc., but of the poisons used in boot polish, especially that for brown boots, by means of which feet have been seriously injured. In view of our recent and present experience of armies in the field, the section dealing with military hygiene should offer a good opportunity for the elucidation of various vexed questions in field organization and equipment. The late Sir Douglas Galton would have seized such an occasion for the deduction of practical results. His position on the Army Sanitary Committee of the War Office enabled him to effect many reforms, but he would have availed himself to the utmost of the opportunity which the Paris congress now offers to call attention to the many points in our South African experience which seem to demand further improvement. The Prince of Wales, in his admirable address at the opening of the congress in 1891, dwelt in forcible terms upon the lessons which might be learned in every life, private as well as public, from the study of the causes of the insidious progress of enteric fever, and it is especially interesting at the present moment to recur to those facts and to note with what acute perception His Royal Highness foresaw the perils of that illness which has assumed such formidable proportions, and which has caused such loss of life in our forces. It is a matter of great satisfaction that the president of the Hygiene Congress at Paris this year is M. Brouardel. No one will command greater confidence from his wide and scientific knowledge of hygiene. M. Brouardel was present at the congress of 1891 and he also attended the meeting of the British Association at Dover in 1899. He is therefore well known to the British public. Under the auspices of so able a president the Congress of Hygiene at Paris should maintain the high position in which it was placed by Sir Douglas Galton at the Congress of 1891.

UNIVERSITY AND EDUCATIONAL NEWS.

COLORADO COLLEGE has secured $100,000 for a new science building.

LORD BUTE has offered to give $20,000 to the

University of St. Andrews for the endowment of a chair of anatomy. His gift is made under the condition that the University make adequate provision for the first two years of a course in medicine. Mr. Musgrove, the present holder of the lectureship of anatomy at St. Andrew's, is to be the first incumbent of the new chair.

THE *Nation* quotes from the *Zeitschrift für Philosophie und Pädagogik* certain conditions prevailing at the German universities regarding admission to the examinations for the degree of Doctor of Philosophy. In all the twenty-one universities of the Empire, the gymnasium graduates are permitted to take examinations in all the departments of the philosophical faculty, while there is no agreement, not even in the universities of the same country, with reference to the promotion of the graduates of the Realgymnasia or the Oberrealschulen; the Real or purely scientific non-classical graduates being nowhere allowed to become candidates for degrees. Those who have completed the semi-classical Realgymnasia are admitted to examinations in twelve universities (of these six are in Prussia), in all departments of the philosophical faculty, while eight admit them in modern languages, mathematics, and natural sciences; and one, the University of Erlangen, only in mathematics and natural sciences. The Oberreal-school graduates (in those institutions the scientific studies strongly predominate) are admitted to the philosophical doctorate in all sections only by Greifswald, in five universities only in natural sciences and mathematics; and in ten (among these six are in Prussia) they are not admitted to a degree at all. Two universities have not yet taken final action in the matter. In view of this, the action of the German Realschul Association, representing the interests of the higher non-classical education in Germany, at the recent convention in Berlin is of interest. At this meeting, attended by more than three hundred philologians, a petition, originally drafted by the National German Society of Engineers, and signed by 12,000 names, was adopted, asking that the graduates of all the nine-year secondary schools, *i. e.*, the Gymnasia, the Realgymnasia, and the Oberrealschulen, should alike and without discrimination be admitted to university privileges and degrees, and that in future the lowest three classes in all the schools of this kind should have the same non-Latin courses. This petition has been presented to the Cultus-Minister of Prussia.

DR. ALWYN S. WHEELER, Ph.D. (Harvard), has been elected to the assistant professorship of chemistry in the University of North Carolina.

THE following have been elected professors and lecturers of Royal College of Surgeons of England for the ensuing collegiate year: Hunterian Professors, Mr. Charles Stewart, M.R.C.S. Eng., F.R.S., Mr. Percy Furnivall, F.R.C.S. Eng., L.R.C.P. Lond., and Mr. Christopher Addison, F.R.C.S. Eng., M.D., B.S. Lond., L.R.C.P., Lond., Arris and Gale lecturer, Mr. T. G. Brodie, M.R.C.S. Eng., M.D. Lond., L.R.C.P. Lond., Erasmus Wilson, lecturer, Mr. Walter Edmunds, F.R.C.S. Eng., M.B., M. C. Cantab. Mr. S. G. Shattock, F.R.C.S. Eng., was re-elected pathological curator, and Mr. R. H. Burne was re-elected anatomical assistant in the museum.

THE registration at the first summer session of Columbia University was 417. The attendance consisted of 114 men and 303 women of whom about 80 per cent. were teachers.

MR. F. P. SPALDING, a graduate of Lehigh University, who has been instructor in that University and in Cornell University and has recently been acting as a professional engineer, has been appointed professor of civil engineering in the University of Missouri.

DR. J. C. SHEDD, instructor in physics at the University of Wisconsin, has accepted the professorship of physics at Colorado College, to succeed Dr. S. J. Barnett, who goes to Stanford University.

DR. WALTER E. GARREY formerly assistant in the department of physiology of the University of Chicago, has been elected to chair of physiology in Cooper Medical College, San Francisco, Cal. This summer he was one of the instructors in the course in physiology at the Marine Biological Laboratory, Woods Holl, Mass.